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Contractors and Engineers Monthly

Vol. 48, No. 10 OCTOBER, 1951 $4 a Year, 50 Cents a Copy

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Photo Courtesy of Basalt Rock Co.

Concrete panels prestressed at the Basalt Rock Co. plant rise into place for a South San Francisco warehouse. A light crane can handle the 5½ x 20-foot panels made of precast T&G blocks. End plates provide convenient lift points and a simple welded connection to the steel building frame. Page 17 reports many applications of prestressed concrete.

Covering the Field

• Contract Time Overruns
Washington's Director of Highways makes suggestions on how owners and contractors can prevent them. Page 3.

• Refuse Plant
Wellpoints lower water on the marshy site for a Long Island refuse-disposal plant. Turn to page 5.

• Airport Expansion
Floods held up the paving contract at Kansas City Airport—but not for long. Job report on page 11.

• Discuss Prestressed Concrete
The U. S. holds its first conference on the new material. Summary on page 17.

• Shoulder Maintenance
Maryland surfaces gravel shoulders with asphalt and slag as a safety measure. Story on page 24.

• Tunnels Under Mountains
Pole Hill and Olympus, under the Colorado Rockies. The contractor is ahead of time. Story and pix on page 28.

• Flood Control
Slopes were steep on a channel near San Fernando, Calif., but the contractor thought up a way to line them. See page 37.

The Corps of Engineers has extended flood protection of Memphis, Tenn., by building a reservoir, a levee, and a 2-mile storm-water conduit. Page 91.

• Bridge Paved With Concrete
Buggies on a rolling platform speeded pours. Page 42 covers the rush job.

• Building Construction
The Jacksonville, Fla., branch of the Federal Reserve Bank of Atlanta gets a new building. H-beams are encased in RC columns. See page 48.

• Road Pioneer in West
Page 54 carries a Portrait in Print of R. H. Baldock, Oregon Highway Engineer.

• Grading a State Route
Scrapers handle dirt on Mississippi 43. Drainage, base course, and a double bituminous surface are included. Page 60.

• Concrete Paving
A 3-mile reconstruction eliminates a curving narrow stretch of the Airline Highway in Louisiana. Page 69.

• Safety for Personnel
How Austin Co. won a plaque for its safety record on the AEC project at Argonne, Ill. Top-management backing was one of the secrets. Good safety merchandising was another. See page 72.

• Pressure Pipe Laid
Page 82 tells how Mobile, Ala., laid 16 miles of pipe as part of a $7,000,000 water-supply project.

• Hot-Mix Paving
U. S. 80 becomes a divided highway throughout 18 miles between Midland and Odessa, Texas. Story and pix, page 84.

• County Makes Beach
Man takes over from Nature to create a 24-mile sand beach. Seawall repairs, extensive drainage, and hydraulic fill were part of the seacoast improvement. Page 97.

(You will find "In This Issue" on page 4)

NEWS AND VIEWS

of the construction industry — effects of NPA Order M-4A, reactions to it.

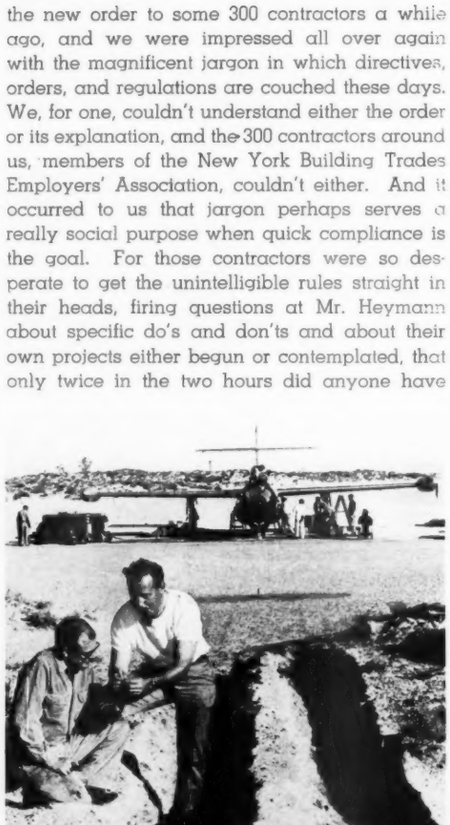
This month the entire construction industry begins operating under the Controlled Materials Plan—NPA Order M-4A. The old order, M-4, limited construction according to the use and cost of the proposed project. The new order, M-4A, employs only one major criterion: how much controlled material will the project consume?

Here is the end effect on anyone who wants to build a house, store, or factory. He may go ahead without having to get Government permission provided he is not going to use more than stated minimum amounts of steel and copper. He himself authorizes his orders for controlled materials, writing "Certified under CMP Regulation 6" and adding the symbol U-7 if it's a house he wants to build, U-6 if it's an industrial plant, or U-8 for other structures such as stores. He gives these orders to his distributor and obtains the materials directly. (The exception here is amusement or recreation structures—no self-authorization!) However, **if he needs more than the minimum amounts of materials, he applies to the NPA** or the appropriate Government agency.

There, of course, is the rub. For **the minimum amounts of controlled materials have been set so low as to require Government permission for almost everything but small buildings.** Moreover, NPA criteria for determining "essentiality" and granting permission to construct have been made **more stringent than ever before.** And even if anyone secures permission and the related material allotment, he may still have to scrounge around frantically to find a warehouse able to deliver.

In any case, M-4A virtually puts a stop to the building of recreational structures. It relaxes controls somewhat on small building projects. It tends to tighten them on larger building projects. And in applying its criteria of essentiality, the **NPA will defer all nondefense construction that can possibly be deferred during this fourth quarter of 1951** and probably during the first quarter of 1952.

We listened to H. M. Heymann, Counsel for the NPA's Construction Controls Division, explain the new order to some 300 contractors a while ago, and we were impressed all over again with the magnificent jargon in which directives, orders, and regulations are couched these days. We, for one, couldn't understand either the order or its explanation, and the 300 contractors around us, members of the New York Building Trades Employers' Association, couldn't either. And it occurred to us that jargon perhaps serves a really social purpose when quick compliance is the goal. For those contractors were so desperate to get the unintelligible rules straight in their heads, firing questions at Mr. Heymann about specific do's and don'ts and about their own projects either begun or contemplated, that only twice in the two hours did anyone have time to question why's and wherefore's. Mr. Heymann's answer to one of these complainers stays with us yet. Oh, don't give up, was his theme. If the NPA denies you permission to continue a project, you may not have to scrap it entirely. Allotments are sure to be better the second quarter of 1952, and **you may only have to delay your job six months or so!**



U. S. Signal Corps Photo

Trench digging in the jet age—20-mm cartridges fired from six cannon in the nose of a Northrup Scorpion F-89 dug these trenches in the California desert near Muroc. The Scorpion's airborne radar gives it X-ray eyes for seeking out enemy planes and ground installations. Twin Allison jets put it in the 600-mile-an-hour class. It is a formidable weapon in the Air Force arsenal.

As Mr. Heymann pointed out—something had to be done when **fourth-quarter demand for controlled materials promised to be almost twice the known supply.** True. No one—inside or outside the BTEA meeting room—would deny his logic. But some, including the BTEA in a post-meeting statement, have asked, "Did the something have to be M-4A?" By hitting apartment and commercial construction hardest, **it will leave Greater New York on practically a building vacation,** said the Association bulletin. President Fred J. Driscoll noted that New York City construction employment was already 10,000 below last year. "The industry faces serious dislocations and a complete breakdown of its essential teamwork," he said.

There are other signs of dislocation, too. **CMP is sound in theory only, the ARBA contends** in a protest lodged with the Bureau of Public Roads—contractors and highway agencies, after getting BPR authorization, were unable to obtain third-quarter steel delivery from the mills and only promises of curtailed amount for the fourth quarter. Florida and Georgia roadbuilder associations backed up Lt. Gen. Reybold's letter to Commissioner MacDonald. So did AASHO President J. A. Anderson, adding that in his opinion **NPA and DPA did not appreciate the gravity of the highway situation.**

As usual these days, there's no such thing as an easy answer—if any answer at all. It may be that allotments under CMP amount after all to mere hunting licenses. It may be that CMP itself ("Confusion Made Permanent" is the name now making the rounds) will have to be discarded in favor of some other system of controls. Or it may be, as the authors of CMP hold, that everyone sounds off when he's hurt, and everyone was bound to get hurt this time.

Merritt-Chapman & Scott Corp. Photo

Sixty-five years of dependence on ferries ended in August when Boston dedicated this vehicular viaduct between the mainland and Long Island Hospital in Lower Boston Harbor. Merritt-Chapman & Scott Corp. built the substructure for the Institutions Department; Bethlehem Steel Co. the superstructure. See C&E Monthly, March, 1951, page 18.

Engineers Can Reduce Time Overruns on Jobs

They Too Must Take Some of The Responsibility, Says the Washington State Director of Highways; Here's How

• OVERRUNS of contract time are not the problem they once were. But they still occur, they are still irritating, and they still waste public money. W. A. Bugge, Director of Highways for the state of Washington, made some constructive suggestions about how to avoid them, at the annual meeting of the Western Association of State Highway Officials last June. Not only the contractor, he said, but the engineer representing the owner should take responsibility for preventing overruns.

Fixing Time for Completion

In the first place, he said, agencies might give some thought to the basis on which they fix a time for completion —whether by calendar date, by number of calendar days, or by number of workable days. Fixing completion by calendar date or days, and collecting substantial liquidated damages for an overrun, is justifiable, Mr. Bugge said, if the project falls in the same category as commercial building for rental purposes or imperative owner occupancy. Then every delayed day of construction deprives the public of a facility it urgently needs, or necessitates detour or adds to the inconvenience of the highway user. Otherwise undue haste, which ordinarily adds cost, and heavy penalties for overruns are not so necessary. The more he has delved into the subject of overruns, Mr. Bugge told his audience, the more he has been impressed with the workable-day basis of fixing time limits. It would seem to eliminate much of the contractor's speculation and to be more definite for both parties to the contract.

In the second place, engineers seldom analyze carefully enough the conditions and contingencies which govern a "reasonable" time limit. Nor is there a definite yardstick. Given half a dozen engineers to fix the time on the same project independently, you will have half a dozen different answers. Probably the same minute accuracy that dignifies planning and designing cannot be evolved for setting time limits on work. But a better analysis of conditions would make overruns far less likely.

For instance, do engineers give enough thought to the fact that any contractor, however efficient, needs time to assemble his equipment, transport it, and get his organization together and working? Do they consider the isolation of the project? Do they differentiate between the project remote from the labor market and the one close to a metropolis? Nowadays labor wants to work no more than an auto's drive away from home, Mr. Bugge said, and this tends to encumber the isolated project with less efficient help and more unavoidable delays. This, plus the normal number of "quits" or "discharges", plus lack of parts for his machines, the contractor can generally anticipate in normal times, and allow for in his costs before bidding. But these are not normal times; labor and parts are becoming increasingly critical; the accuracy of the contractor's estimates is bound to suffer. The engineer must take this into account when he is fixing a completion date.

Advertising and Letting Contracts

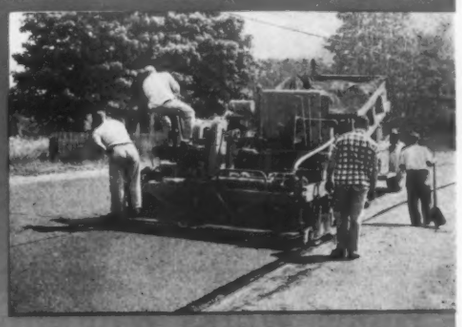
There are other ways the engineer, as owner representative, can help prevent overruns. He can advertise projects in the best seasonal order instead of accommodating them to incoming revenue. Mr. Bugge cited the case of the northwestern states, where annual rainfall varies from 5 to 140 inches. It makes a lot of difference to a contractor where his contract period is sandwiched in under such climatic conditions. Concentrating the construction program in good working months would lower bids, Mr. Bugge suggested. Instead of advertising projects to accommodate incoming revenues, wouldn't it be less expensive to effect a temporary lull in lettings, allow funds to accumulate, and so be able to award more projects in early spring?

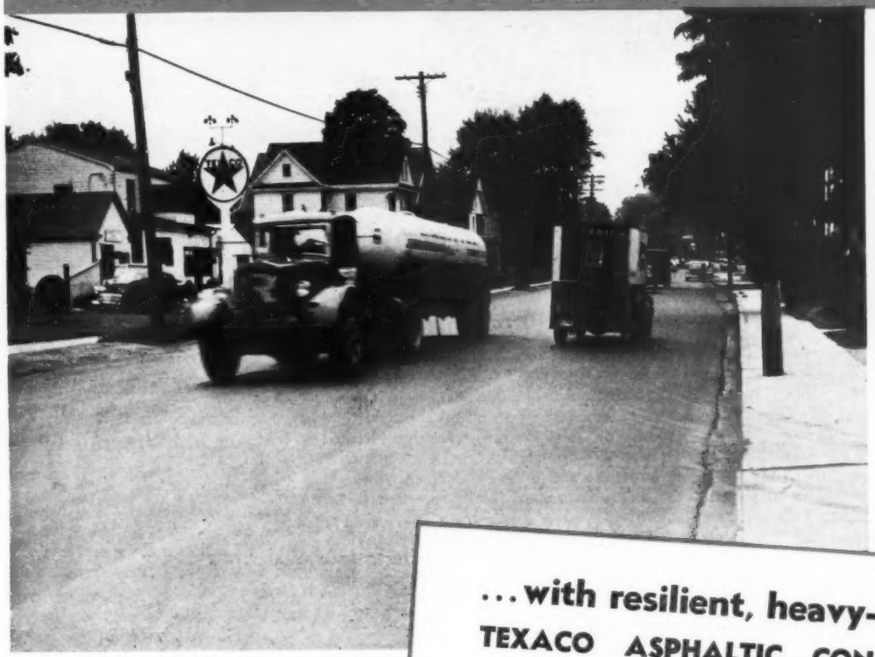
Another thing: the engineer must make awards as quickly as possible after bids are opened, and delay the contractor as little as possible with plan revision once work is in progress. The reasons are too obvious for further comment.

Thus the engineer can help to prevent overruns by analyzing conditions as fully as possibly when he fixes time limits; by advertising projects in the best seasonal order; and by letting contracts as quickly as possible after

(Continued on page 95)

Paving another link in heavily travelled US-1





Texaco Asphaltic Concrete paving under heavy truck traffic on U. S. Route 1 in Stratford, Conn. Asphalt mix for this project was supplied by Leverty & Hurley Co., Inc., of Bridgeport, Conn.

...with resilient, heavy-duty TEXACO ASPHALTIC CONCRETE

U. S. Route 1, which parallels the east coast from Maine to Florida, is one of the country's busiest highways. It carries exceptionally heavy traffic the year around, a large proportion of it truck traffic, plus a steady flow of vacationing motorists.

Many sections of heavily traveled Route 1 from New England south have been paved with the plant-mixed types of Texaco Asphalt construction, both Asphaltic Concrete and Sheet Asphalt. This year, the Connecticut State Highway Department has resurfaced US-1 in the city of Stratford with Texaco Asphaltic Concrete.

Because Texaco-paved highways safely absorb the heaviest impact, need no joints in their construction, suffer no ill effects from ice-control salts and are highly skid-resistant, they are able to deliver lasting service with a minimum of maintenance. That has been the story of their performance from the Atlantic to the Rockies for more than 45 years.

An illustrated booklet containing helpful information on the various Plant-mixed Types of Texaco Asphalt Paving can be secured without obligation by writing our nearest office.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd Street, New York 17
Boston 16 (20 Providence St.) • Chicago 4 (332 So. Michigan Ave.) • Houston 1 (720 San Jacinto St.)
Jacksonville 2 (Hildebrandt Bldg.) • Denver 1 (910 - 16th St.) • Philadelphia 2 (1411 Walnut St.)
Richmond 19, Va. (Mutual Assurance Society Bldg.)

TEXACO

TEXACO ASPHALT

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Public Works With Private Talent

Looking through the 48 states, we notice with increasing satisfaction that many local divisions of government, particularly counties and cities, are solving their public-works problems more and more with the help of private consulting engineers and contractors.

There is much to be said in favor of this development. First, and perhaps most important, is the fact that such works are generally better planned and more soundly built than they might be under the kind of engineering force the voters might approve. Of almost equal importance is the fact that private engineers and contractors are universally in better positions to resist pressure from pressure groups such as property owners, equipment salesmen, and promoters (sometimes for promotion's sake alone) to use various construction materials.

One western city we recently visited was under such pressure from one of the latter groups that in desperation the council by-passed its own engineering organization and turned to a private consulting firm for advice. This firm recommended the contract system. This private engineering firm got rid of the pressure by explaining firmly to all who were interested that the material so vociferously represented was unsuitable and much more costly than native materials close by.

A county we know was permitted by law to pay wages with an upper limit so ridiculously low that the road-building and maintenance force consisted of drunks, stumblebums, has-been's, and never-was's. The quantity and quality of production per man-hour sank to an all-time low in that county.

At the county engineer's own suggestion, a private consulting engineer and contractors were called in to replace the functions of the decrepit, wobbly county gang. The much-needed rehabilitation of bridges and roads is now being blocked off in chunks and let by contract. This is permissible under the laws of that county. As a result, the taxpayers are getting more real value—not idleness and indolence—for their dollars.

Many other such examples we could detail would only emphasize this point.

Many a governmental engineering organization in this nation has, through neglect, inefficiency, and petty graft, allowed itself to go so far past the point of no return that the new turn of events is inevitable. Wherever this statement applies, we hope that public-spirited citizens—engineers, contractors, or otherwise—will make it their duty to see that private talent is brought in. And we mean private talent with the guts to tell politicians, promoters, and pressure groups to go to hell, if their proposals are not in the public interest.

A BLOT ON THE RECORD

Prestressed Pipe

To the Editors,
CONTRACTORS AND ENGINEERS MONTHLY:

In the August, 1951, issue, there appeared an article entitled "Prestressed Concrete, Its Future in the U. S." (C&EMonthly, August, 1951, page 3). This article on the whole is quite comprehensive and very interesting, but we feel that it slighted the concrete-pressure-pipe industry which has been turning out a successful and widely used prestressed product since 1942.

The very first job required 21,000 feet of prestressed-concrete cylinder pipe for a Naval oil depot at Penniman, Va., to withstand a head of 690 feet. The steel cylinder used in the construction of this pipe serves as a mold for the concrete lining, provides additional beam strength, and has other features. One of the larger jobs, in Saginaw, Mich., used 412,630 feet of this pipe.

Very truly yours,
John G. Hendrickson,
Research Engineer,
American Concrete
Pressure Pipe Association,
Chicago, Ill.

Editors' Note: We were, in fact, guilty of this omission, since up to the present time about 99 per cent of all prestressed pipe installed in this country has been a product such as Mr. Hendrickson describes.

More Scrap Today Will Mean More Steel Tomorrow

"The whole success or failure of the mobilization effort may depend upon our ability to solve the scrap problem." These are words of Manly Fleischmann, NPA Administrator.

A few figures tell why. Steel production in 1950 was 95.5 million tons; it took 29.5 million tons of purchased scrap to meet that figure. The steel-production goal in 1951 is 107 million tons; to reach that goal, 32.5 million tons of purchased scrap will be needed.

To help meet this deficit, the Steel Industry Scrap Mobilization Committee of the American Iron and Steel Institute, and the National Production Authority have asked The Advertising Council to launch an emergency public-service campaign of indefinite duration in business and trade papers throughout the country. It aims to accelerate, through advertising, the flow of heavy iron and steel scrap from all industries, *including contracting,* to steel plants turning out material for mobilization. Volunteer coordinator of the campaign is Robert D. Mossman, Manager of Advertising, Jones & Laughlin Steel Corp.

Get Out The Scrap—your own first!

NPA Defines "Possession"

NPA Order M-4A provides, among many other things, that a prime contractor may go ahead and use controlled building materials which he had "in his possession" prior to October 1. Since the construction industry in general does not carry materials in inventory, and often does not take delivery on ordered materials until just before they are to be used, this raises a question of semantics: when are materials in a contractor's possession? The latest clarification by NPA calls it possession when the builder has ordered his controlled materials and the distributor has them earmarked for him.

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C.D. to the Rescue!

"The Rescue Service" should not only be read. It should be seriously studied. Published in pamphlet form by the Federal Civil Defense Administration, this guide is designed to assist state and local civil-defense groups in organizing, selecting, equipping, and training teams to rescue people trapped in bombed buildings.

CONTRACTORS AND ENGINEERS MONTHLY readers are especially concerned in this work, for it is they who can make the greatest contribution. No amount of goodwill can take the place of technical knowledge when it comes to dealing with a partly demolished building, and the outcome may stand or fall (literally) according to whether or not the rescue squads are led by men with construction and engineering training.

This pamphlet is based not only on the experiences of the United States in organizing for civil defense in World War II, but also on the vital experience of the British during the heavy bombing raids on London and other cities. Adapted to postwar thinking, the techniques then in use have helped in the drawing up of a valuable guide for the organization of rescue teams. The book covers the functions and organization of rescue squads, with diagrams suggesting models of state and local rescue services. There is a map showing a typical state division into civil-defense sections, and an appendix which describes the standard functions and qualifications of rescue teams.

"The Rescue Service" (Federal Civil Defense Administration Publication AG-14-1) is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The price is 15 cents.

New Plant Is Built For Refuse Disposal

Wellpoint System Lowers Water on Marshy Site for Concrete Foundation Pours; Plant to Serve Growing Community

By WILLIAM H. QUIRK,
Eastern Editor

• SUBURBAN Long Island, N. Y., and Nassau County in particular, is experiencing one of the greatest housing booms in its history. With the fast-growing population, new facilities to serve the additional residents are in constant demand. The Town of Hempstead, Nassau County, is meeting the needs of its populace, in one of many respects, by constructing a new refuse-disposal plant that will serve an area of 125 square miles. Construction of this modern concrete, steel, and brick plant was started in July, 1950, and was scheduled for completion this summer at a total cost of approximately $2,200,000. Hendrickson Bros., Inc., of Valley Stream, N. Y., was general contractor.

The structure is situated between Freeport and Merrick on a strip of land extending south from Merrick Road, State Route 27A, over 6,000 feet to Merrick Bay. The 1,200-foot approximate width of the tract is bounded on the west by the Meadowbrook Parkway, and on the east by a meandering creek. About 120 acres of the 167-acre site will be used for land-fill disposal of furnace residue.

Included in the general contract was the refuse-disposal plant building, access roadway, turning plazas, grading, water supply system, sanitary-sewage system, storm-water drainage system, garage, metal and wood storage building, pump house, and landscaping. The plant building includes two separate tipping rooms; two separate refuse pits on either side of the central portion of the building which is devoted to furnace and boiler equipment and accessories; a scale wing, and office wing for storage; washroom and office facilities; a power wing to house power-generating equipment; and a residue-storage wing.

Concrete, Steel, Brick Buildings

Built of concrete, steel, and brick, the principal building of the plant measures approximately 240 feet east and west, by about 90 feet north and south. Off the north side of the building near the east end is the 47-foot 6-inch x 53-foot power wing. In similar position near the west end is the 47 x 36-foot office wing. At the southwest corner is the scale wing, measuring 39 x 50 feet. From the south-central part of the building is the 26 x 24-foot 6-inch residue wing. The garage is a separate building, 61 feet 4 inches x 73 feet 6 inches, east of the main plant. The 25 x 75-foot metal and wood storage building is also a separate structure located south of the plant.

The project includes the complete installation in the plant building of four incinerator units in four separate furnace chambers. Each rotary-type furnace has a rated capacity of 7 tons of mixed refuse per hour, giving the plant a total capacity of 672 tons per 24-hour day. Tin cans, wire, and other metal left as furnace residue will be screened out and hauled to the disposal area, flattened, and then spread out over the marshes along with other noncombustible material that will be collected separately.

Water for the plant is supplied from a deep well on the site, and was also available to the contractor during the construction operations. The pump house is located just north of the main building. Sanitary sewage is piped out to a septic tank built east of the plant. Fly-ash from furnace waste is drawn off to a lagoon west of the building.

Wellpoints Lower Water Table

The building site is as flat as a table and is agricultural land, while to the south lies a salt marsh overlying a deep stratum of well packed sand. Natural ground averages 4.0 elevation (mean sea level), with ground water found just below the surface at approximately

(Continued on next page)

C. & E. M. Photo

A general construction view of the refuse-disposal plant which the Town of Hempstead, Nassau County, N. Y., has built to serve its fast-growing population.

This advertisement appeared in leading newspapers September 12. It is the first of a series in behalf of a modern highway system.

We Must Face the Highway Crisis Now

—*there is only one real cure!*

ONE of the greatest home-front threats to the welfare of every American is the congestion on our highways today.

It is not only a menace that costs thousands of lives in needless accidents and millions of dollars in wasted time every year—*it is a peril to national security!*

Without motor transportation the nation would stagnate. It has become the lifeblood of America's economy. The highways are its arteries—and they are hardening fast!

Remember these facts

Motor transport now carries 80% of all interstate passenger traffic — takes more than 50% of all workers to their jobs.

It speeds 90% of all foods to market—hauls 75% of all general freight.

It is the swift plant-to-plant conveyor of raw materials, parts and subassemblies that keeps America's mass-production lines going—that makes America's unprecedented prosperity possible.

Roads are the bottleneck

To keep America moving today requires the daily use of almost FIFTY MILLION motor cars, trucks and buses —more motor vehicles than all the rest of the world possesses!

Yet this vital transport system is now jam-packed into an obsolete highway system—*most of it designed prewar to comfortably accommodate less than half today's vehicular mileage!*

And motor registrations have been soaring since the war at the rate of 3.7 million per year.

We should have action NOW!

We cannot cut this Gordian knot by restrictive laws. The crux of the problem is not the number of cars or the size of trucks—*it is too few modern roads!*

To keep our nation mobile, we must start building a new national highway system now, designed for modern traffic needs and speeds.

Such a modern road system is essential to our prosperity and vital to our defense in this atomic age. And we have the world's most efficient road-building industry equipped to construct it in less time than ever possible before.

The time has come when we must do something about better roads besides talk. The demand for action must come from everyone who uses the highways—and that's just about everybody.

P. W. Litchfield

Chairman of the Board
THE GOODYEAR TIRE & RUBBER COMPANY, INC.

GOODYEAR
THE GREATEST NAME IN RUBBER

New Plant Is Built For Refuse Disposal

(Continued from preceding page)

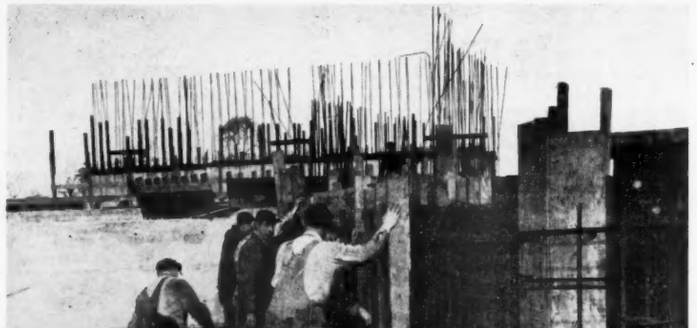
2.8 elevation. To reach the site, some 1,500 feet south of the highway, the contractor first built an access road over the marsh, using dirt dug from a borrow pit located between the Merrick Road and the plant area. At this point, on slightly higher ground, a hole was opened up 500 feet long x 300 feet wide and averaging 4 feet in depth. Since the hole was dug during the dry summer months of July and August, ground water presented no particular difficulty at the borrow pit; later the pit was underdrained to keep it dry. The borrow area will be developed into a dry depressed lawn with landscaping.

Five 12-yard tractor-scraper units skimmed off a 12-inch layer of rich topsoil, and stockpiled the material for future use in landscaping the area. About 22,300 cubic yards of topsoil were involved in this move. Beneath the black marsh muck was the sandy gravel bottom that served as the foundation and bed for the access road. Borrow excavation totaled 34,200 yards to build a roadway 26 feet wide flanked by 8-foot shoulders and a 40-foot planting area. The pavement consists of a 5-inch rolled crushed-stone foundation course, topped by a 2-inch course of bituminous macadam. The road grade is 6.0 at Merrick Road, but climbs up to 13.0 at the rear of the plant where the collection trucks will dump into the refuse pits from the tipping rooms at each end of the building.

Light and power lines were also brought into the site from the distribution system on Merrick Road. Before foundation excavation got under way at the plant, a Griffin wellpoint system was installed to lower the high water table. The header pipe, which enclosed the building except for a small gap where the line dead-ended on one side, totaled 960 linear feet. Of this, 660 feet was 10-inch and the remaining 300 feet was 8-inch header. Risers, 1½-inch diameter x 17 feet long, were spaced on 5-foot centers and jetted in place. Two 8 x 10-inch pumps were hooked to the line, but after the initial drawdown, only one was kept working, with the other held in reserve as a standby. In this way the ground was dewatered down to minus 11.0 elevation. The amount of discharge was measured over a weir before it emptied into the creek adjoining the site.

Reinforced Concrete Foundation

With the water under control, the tractor-scraper units also excavated the foundation for the plant, removing about 12,600 yards of material. Some of this dirt was stockpiled for use later as backfill, while the rest went into the road grading. The hole dug for the main building averaged 260 feet long x 100 feet wide, with a general depth down to minus 8.0 elevation. In some places the excavation went deeper to accommodate a grade beam at the center of the building with a bottom elevation of minus 10.5.



C. & E. M. Photo

Hendrickson Bros. workmen set a wall-panel form for the plant.

Foundation dimensions varied considerably because of the type of structure. Foundation slabs ranged from 2 to 3½ feet in thickness, according to the loads, while the walls varied from 15 to 25 inches. Class A concrete of 3,500-psi strength was used in the foundations and footings, with 7 bags of cement to the yard and 6 gallons of water to the bag of cement. Class B concrete of 2,500-pound-strength was also used in the garage and the metal and wood storage building.

As a protection against sloughing of the slopes, sheeting was driven along portions of the sides of the hole. The sheeting was 2 x 10's, usually 10 feet long, driven with a Gardner-Denver pneumatic hammer powered by a G-D 210-cfm air compressor. What the scrapers did not get out of the hole in excavating was taken care of by truck and crawler cranes—a Lima ½-yard truck crane with a 47-foot boom, a Bucyrus-Erie 38-B crawler rig with a 60-foot boom, and a Bucyrus-Erie 51-B

(Continued on next page)

the new Detectron

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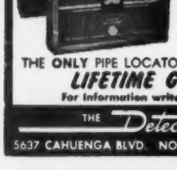

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using either a 2-yard clamshell or a 2-yard drag bucket. The drag bucket saw service in digging the lagoon for the fly-ash discharge. These cranes were also used in concrete placing. The 51-B machine was equipped with 70 and 90-foot booms together with a 30-foot jib; the 120-foot length of stick was useful in the higher pours.

Wooden Forms

A carpenter shop was set up on the site to build the form panels; shop equipment included a C.H. & E. 18-inch table saw and a Speedmatic 88C portable electric saw with an 8-inch blade. Most of the formwork consisted of ¾-inch plywood backed with 2 x 6 studs on 12-inch centers, and double 2 x 6 wales spaced on an average of 2 feet 6 inches on centers. The panels were held in place with Richmond ties. Bethlehem Steel Co. supplied the 251 tons of reinforcing steel going into the concrete.

Above the foundation, the structural concrete had a 3,500-psi strength at 28 days, and contained 7 bags of cement to the yard, with a water content of 5½ gallons to the bag of cement. Concrete for the project totaled approximately 3,500 cubic yards. Two firms supplied the truck-mixed concrete—Ryan Concrete Co. of Farmingdale and the Transit Mix Co. of Rockville Centre, located 8 and 4 miles from the job respectively. The truck mixers generally discharged the concrete into buckets that were lifted to the forms by the cranes. Three Insley laydown buckets—two at 1-yard and one at 1½ yards—and a Blaw-Knox 1-yard bottom-dump bucket were used.

When the drop into the forms was more than 7 or 8 feet, the concrete was placed through hoppers and elephant-trunk pipe. As the concrete was deposited, it was vibrated with Maginniss electric vibrators; two units were available—one 4-kw set with four leads, and a 2-kw set with two leads. Despite the marshy nature of the site, no bearing problems were encountered with the heavy concrete foundations which went down to firm footing in the deep sand stratum. However, a working mat of plain concrete 3 inches thick was poured within the building area in advance of the foundation slab work. Thus the reinforcing steel was kept free of dirt, with no chance of any rods being pushed down into the sand.

Winter Work

The bulk of the foundation work was done during the winter, which turned out to be fairly mild. Whenever the temperature dropped below 40 degrees F, the water and aggregate were heated at the central batch plants before the truck mixers were loaded. As a preparatory step, any ice that had collected inside the forms was melted with a kerosene torch before the concrete was deposited. Tarpaulins and salamanders protected the new concrete from freezing during the initial stages of setting up. Later salt marsh hay was spread over the pours for curing. In milder weather the curing was done with Sisalkraft paper.

C. & E. M. Photo

Front row, left to right: Frank Boldt, Resident Engineer for Henry W. Taylor; Ed Ahneman, Hendrickson Superintendent; Bill Schulze, Hendrickson Field Engineer. Back row: Theodore Wielandt, brick masonry contractor; Frederick Hoppler, Inspector for Hempstead; and Michael Kopp, Superintendent for Wielandt.

Because of the high water table at the site and the proximity of the bay, the structure was designed to withstand the effects of water up to a maximum 6.5 elevation. All vertical joints have copper water stops, while ⅛ x 8-inch steel strips seal off the horizontal joints. The concrete contains no admixtures, but the outsides of the walls below the ground level are waterproofed with two coats of asphalt. The wellpoint system was kept in operation until December, 1950, at which time the foundation walls and slabs were in, along with sufficient steel bracing to ward off any potential danger of the structure "floating" in the event of high water from heavy rains or abnormal tides.

Bethlehem Steel Co. supplied the 400 tons of structural steel for the plant superstructure; erection got under way last November. Shop connections were riveted, but Dardelet bolts were used in the field erection. Floors are at various levels, and are constructed of reinforced concrete with slab thicknesses ranging from 6 to 12 inches. The main floor is at 7.5 elevation, and the second floor at 27.5; in the rear of the build-

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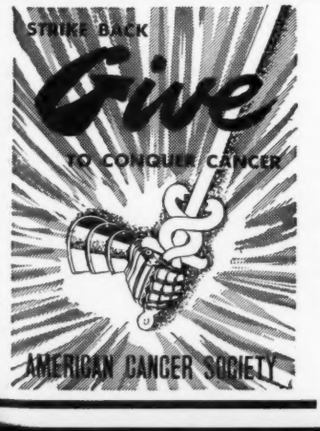
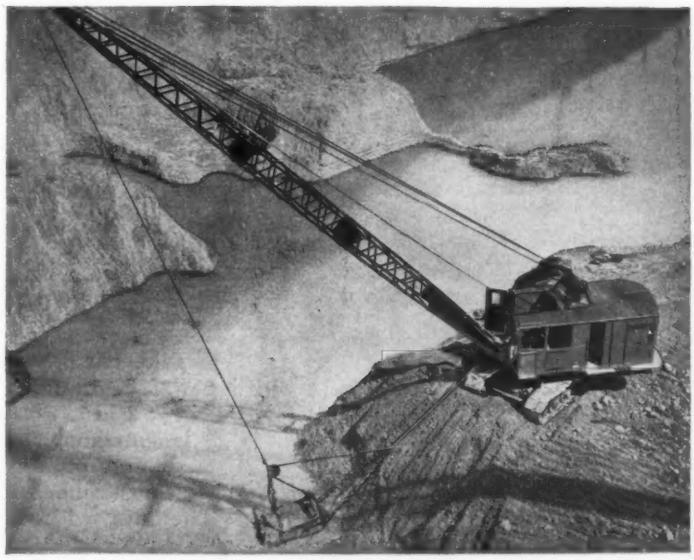


WIRE ROPE

You'll save time and cut costs with ROEBLING rope

FAST OPERATION AND DOLLAR SAVINGS are more important than ever in excavating and construction. One sure way to save time and expense is to specify Roebling Preformed "Blue Center" Steel Wire Rope. Here's a tough rope that stands up under shocks, strains and high speeds. Its preforming always assures maximum handling ease, better spooling and much smoother performance on the job.

Roebling makes a full line of wire rope. Have your Roebling Field Man recommend the *right* ropes for your equipment. And for longest life, get his advice on the correct use and maintenance of wire rope. It is based on experience with thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.



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New Plant Is Built For Refuse Disposal

(*Continued from preceding page*)

ing is a mezzanine at the 32.0 level. Welded steel trusses support a Cemesto 2-inch roof deck laid in 4 x 8-foot panels, and topped with Barrett 4-ply built-up roofing material.

Brick Walls

Above the concrete foundation walls, ending just above the ground level, the building has walls of gray face brick backed with sand-lime brick. Total wall thickness is 15 inches. The Wielandt Construction Co. of Rockville Centre, N. Y., did the brick masonry work that totaled approximately 900,000 bricks. The Hanley Co. of Somerville, Pa., supplied the face brick. The masonry work was completed between February and May.

The plant has two short steel stacks that extend only about 10 feet above the level of the roof. Induced-draft fans will insure an exit velocity of 60 fps from the stacks.

Henry W. Taylor, New York City consulting engineer, designed the plant. He was represented on the construction project by Emil Siebert and Frank Boldt, Resident Engineers. Frederick Hoppler was Inspector for the Town of Hempstead.

A working force of approximately 60 men was employed on the contract. For the general contractor, Hendrickson Bros., Inc., Ed Ahneman was Superintendent, and Bill Schulze, Field Engineer.

The total project includes eight separate divisions, of which the current construction is Division I. Hendrickson Bros., Inc., also has a contract for the condenser-cooling water conduit and pump house. Approximately 1,200 feet of 3-foot-diameter reinforced-concrete pipe is to be laid from an intake structure in the Stadium Park Canal to supply salt water by gravity to the pump house. This water will then be pumped by four 3,000-gpm turbine pumps through 2-foot-diameter cement-asbestos pipe to the power wing of the main building. There it will circulate through steam condensers for the condensation of steam generated in the waste heat boilers which receive the hot flue gases from the combustion of the refuse. Part of this steam will be used to produce power for the operation of the plant and its 79 motors, for space heaters, and for lighting buildings, access road, and plazas. The cooling water will be screened at the intake structure and by a traveling screen in the pump house.

Rotary Impact Tool

A new electric Impactool for tough nut-running jobs is manufactured by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The Size 34U has a 1-inch-square driver and is rated for bolts up to 1¼ inches. It is 10⁹⁄₁₆ inches high, 4¾ inches wide, and 14⅛ inches long. These dimensions do not include the adjustable-grip handle, which may be attached in any one of three positions, or removed entirely if desired. Another handle with the trigger switch may also be rotated 180 degrees.

The 34U weighs 32½ pounds and is equipped with a heavy-duty plug and 3-conductor cable. A complete line of nearly 100 different power sockets and accessories is available.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 702.

The 34 U Impactool is designed for tough nut-running jobs. It is rated for bolts up to 1¼ inches.

Material-Handling Equipment

A 12-page illustrated bulletin on flight and belt-type portable conveyors and under-car unloaders for handling sand, gravel, coal, coke, and other bulk materials is available from Lake Shore Engineering Co., Iron Mountain, Mich. Brief specification data are given on both electric and gasoline-powered models and on hand-move and self-propelled conveyors.

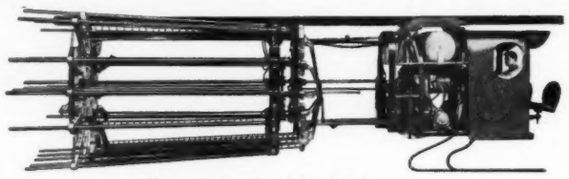
This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 773.

INCREASE TUNNEL-DRIVING SPEEDS 80% and REDUCE LABOR COSTS 92% with

DEMO-CANON AUTOMATIC GANG DRILL

- Drilling Speeds of 7″ to 36″ per minute.
- Self Contained Power Plant.
- 28 Fully Automatic Electric Hammer Drills.
- Drills May Be Moved in Vertical or Horizontal Direction.
- Drill Speed Adjustable from 300 to 3,000 RPM.
- Push Button Type Controls on one operating Panel.

TWO MEN OPERATE 28 DRILLS



Write Today for full details

DEMO-CANON ENGINEERING AND MANUFACTURING CO., INC.
2215 S. Sepulveda Blvd., Los Angeles 25, Calif.

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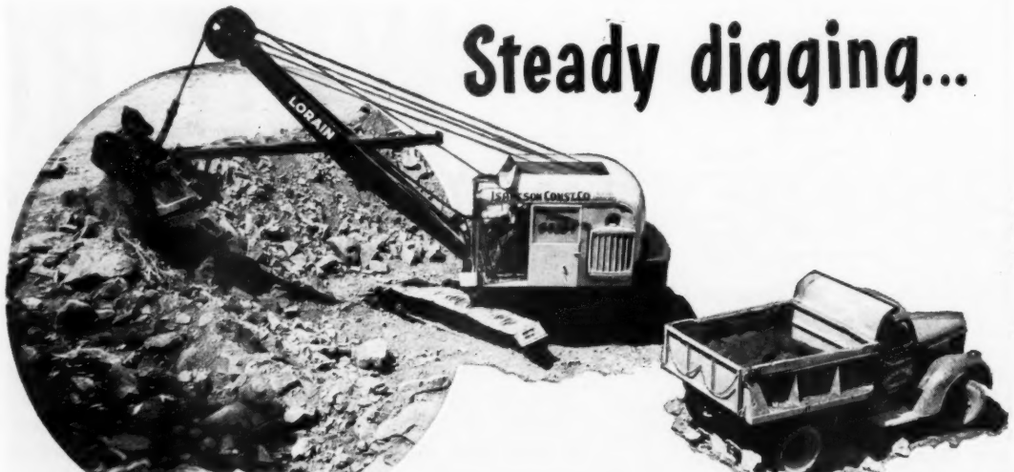

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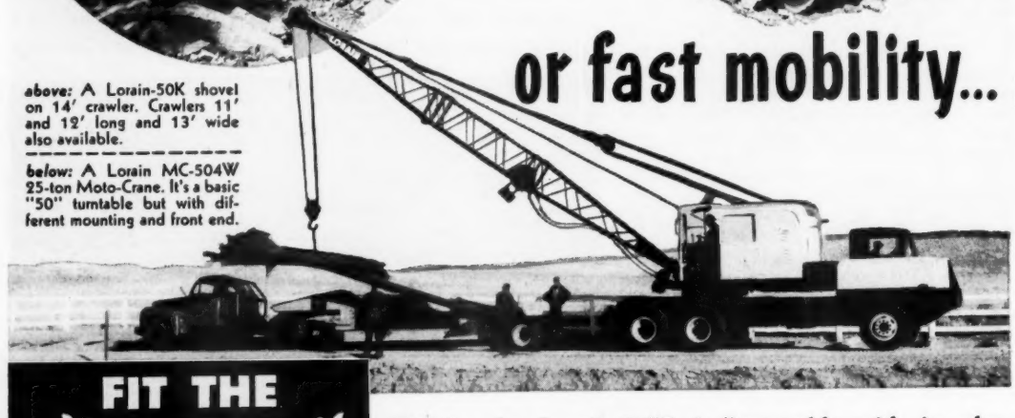

above: A Lorain-50K shovel on 14′ crawler. Crawlers 11′ and 12′ long and 13′ wide also available.

below: A Lorain MC-504W 25-ton Moto-Crane. It's a basic "50" turntable but with different mounting and front end.

FIT THE "50" TO YOUR JOB

■ Take the Lorain-50 "Series" turntable with its plus-power engine and shock-absorbing hydraulic coupling. Then, if it's a crawler job, choose from *four* crawlers in 3 lengths and 2 widths. Or — if you need high speed travel and unlimited mobility — put the Lorain-50 turntable on a rubber-tire Moto-Crane with 4 or 6-wheel drive. Then fit it with shovel, crane, clamshell, dragline or hoe — and you're in business for profit for a long time to come. Investigate the Lorain-50 "Series" story when you're ready for your next 1-yard class machine!

FOR FACTS ON THE "50" SEE YOUR THEW-LORAIN DISTRIBUTOR

LORAIN 50 SERIES

LORAIN "50" SELECTION FOR BIGGEST JOB PROFITS

BASIC TURNTABLE DESIGN	1
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THE THEW SHOVEL CO.
LORAIN, OHIO

THEW LORAIN

SHOVELS
CRANES
CLAMSHELLS
DRAGLINES
HOES

Auger and Derrick Set on Small Trucks

A new combination post-hole digger and pole-setting derrick for small trucks has been engineered by Tel-E-Lect Products, Inc., 10033 Minnetonka Blvd., Minneapolis 16, Minn. According to the company, any ¾ or 1-ton truck with an ordinary service body can accommodate the new unit. The entire rig is shipped from the factory ready to be installed on any service truck by a local mechanic.

Interchangeable augers on this Model 325 range in size from 8 to 20 inches. The derrick handles poles up to 35 feet in length. Tel-E-Lect also recommends its use for guardrail setting. The company states that anyone can operate the mechanism and that normally it takes two men less than ten minutes to set up the derrick, attach the digger, dig the hole, and set the pole ready for tamping.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 775.

One-Ton Lift Truck

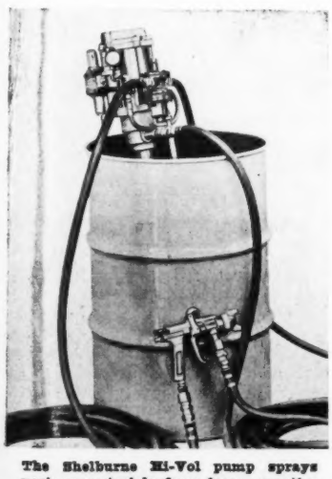
New pneumatic-tired lift trucks with a capacity of 2,000 pounds at 15 and 24-inch load centers are now manufactured by The Buda Co., Harvey, Ill. Features of the fork trucks include a carriage mounted on patented adjustable side-thrust rollers to eliminate wear; a high-strength self-aligning mast; a single-lever two-speed-forward and two-speed-reverse gearshift; and a quick-change heavy-duty clutch. The trucks are powered by a 4-cylinder engine with a displacement of 61 cubic inches, and are available in five standard masts with lifts of 72, 84, 108, 114, and 120 inches.

Further information may be obtained from the company by requesting Bulletin 1550. Or use the Request Card at page 16. Circle No. 721.

New Spraying Pump

A pump designed to handle materials from heavy mastics to enamels and lacquers has been announced by A. Shelburne Co., 739 Ceres Ave., Los Angeles, Calif. The Shelburne Hi-Vol provides fast delivery through double-action pistons which force the material through the lines on both up and down strokes of the air motor. Its 9 to 1 ratio permits spraying material to great heights directly from the material drum. Control of the pump is automatic; a special valve shuts off the pump and relieves all pressure when the gun is not in operation. The Hi-Vol is also available with agitator, oiler, and pressure regulator for use on a 5-gun circulating system.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 771.



The Shelburne Hi-Vol pump sprays various materials from heavy mastics to enamels and lacquers.

Any ¾ to 1-ton truck with an ordinary service body can accommodate the new Model 325 Tel-E-Lect post-hole digger and pole-setting derrick.

Data on Reinforcing Bars

Literature describing reinforcing bars and their accessories is available from Bethlehem Steel Co., Bethlehem, Pa. The Bethlehem bar is a round deformed bar of constant section made from new-billet steel which meets ASTM Specification A15. It is rolled in sizes conforming to U. S. Department of Commerce Simplified Practice Recommendation R26-50. The folder illustrates the bar and tabulates dimensions. It also describes bar accessories: slab and beam bolsters; bar, high, and joist chairs; and continuous high chairs.

This literature may be obtained from the company, or by using the Request Card bound in at page 16. Circle No. 703.

How to get MORE WORK from your "Cat" Motor Grader!

HERE'S the situation in a nutshell. The speed, versatility and big work capacity that have made "Caterpillar" Motor Graders an essential construction tool have also made them necessary to the defense effort. As military orders must be filled first, you may not be able to obtain prompt delivery of new machines. So it will pay you to plan *now* to get greater production and longer wear from your present equipment.

"Cat" Motor Graders are ruggedly built for long life. But good care on your part can lengthen that life span by thousands of extra service hours. Here's how:

1 Follow the recommended *operating* care in your Operator's Instruction Book. Read and reread it.

2 Observe the *maintenance* suggestions in the Operator's Instruction Book. They're down-to-earth – experience has proved them practical and effective.

3 Anticipate your future replacement parts needs by seeing your "Caterpillar" dealer about them *now*. Don't wait until wear gets beyond repair – many a part can be rebuilt *if* serviced in time.

You're in good hands when you work closely with your "Caterpillar" dealer. He is anxious to help you solve your problems. He has the skilled mechanics and service facilities to help you lick them and keep your equipment in shape.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

You're the Doctor Preventive maintenance is good medicine for long life. Your Operator's Instruction Book is invaluable in the fight to conserve machine life. Follow the operation, lubrication and maintenance recommendations. When wear is evidenced in cutting edges, gears, tires or engine, see your "Caterpillar" dealer. He can help you prolong the life of your motor grader. Your motor grader is essential—don't abuse it!

Fast worker—reliable, too! This "Caterpillar" Diesel No. 12 Motor Grader is one of thousands that help construction men meet their contracts on schedule. An essential earthmoving tool, it stands up under tough going – handles easily. As a military tool, it's essential for airport construction and maintenance, road construction, the establishment of bases and scores of other jobs.

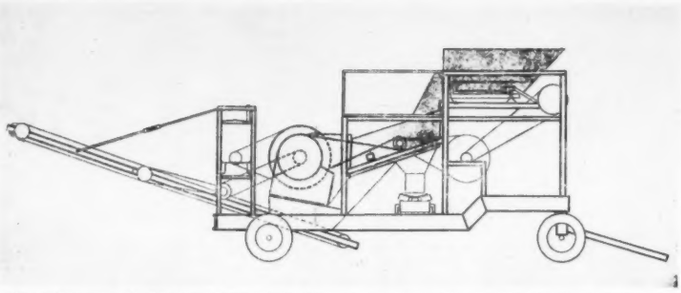
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

Single-Pass Plant To Process Gravel

A single-pass gravel plant, designed for small jobs and wherever aggregate specifications are not restrictive, has been introduced by Diamond Iron Works, Inc., 18th Ave. N. and Second St., Minneapolis 11, Minn. Capacities, based on 25 per cent oversize passing a 1-inch screen, are approximately 20-24 tons per hour for the No. 116 plant, 48-60 tons per hour for the No. 120, and 50-65 tons per hour for the No. 124 plant.

The unit is portable and self-contained. Its single-pass design features a 1½-deck vibrator screen that scalps off the oversize material and delivers it to the crusher. Crushed material is remixed with the by-passed gravel, thereby eliminating rescreening and regrading.

Model No. 116 carries a 10 x 16-inch roller-bearing jaw crusher, No. 120 a 10 x 20-inch, and No. 124 a 10 x 24-inch crusher. The jaws crush oversize to minus 1 inch if required. Jaw adjustments permit production of up to 2½-inch size. A hinged delivery conveyor delivers the screened fines and crushed material, remixing both before loading to trucks or onto conveyors for stockpiling.



The Diamond single-pass gravel plant comes in three sizes with capacities of 20 to 65 tons an hour. The unit is portable and self-contained.

Features of the new plants include a steel I-beam gooseneck frame, 6 x 8-inch grizzlies with 9 x 10-inch openings, 16 x 5-inch reciprocal plate feeders, sloping vibrating screens (No. 116 and No. 120—2 x 6-inch; No. 124—3 x 6-inch), 2-yard folding feeder hoppers, V-belt drives, clutch-controlled material flow, and an operator's platform permitting full view of the entire plant. An 18-inch-wide sand-rejector conveyor is optional equipment.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 763.

New Diesel Engines Power Heavy Trucks

A new engine known as the Million-Miler now powers the diesel trucks and highway tractors made by GMC. It is a new design of the 4-71 and 6-71 GMC diesel, and Series 650, 740, 750, 900, 950, and 970 trucks and tractors will use it. It will not make former GMC diesels obsolete, however, since its components are interchangeable with those of the old diesels, the company says.

Horsepower in the new 4-cylinder engine is boosted to 150 bhp compared to 133 in the former model, and the 6-cylinder engine is now 225 bhp. A fuel modulator automatically feeds the proper amounts of fuel and air regardless of throttle position. This economizes on fuel, say GMC engineers, and lengthens engine life by preventing engine abuse and restricting "sludging up" and carbon deposits.

Other new features: a camshaft that keeps valves open through a greater portion of the shaft revolution, providing free breathing and scavenging of the burned gases; an increase in the governed top speed for less shifting: larger fuel injectors to supply the necessary amount of fuel for the optimum air-fuel ratio; ground faces for the cylinder head and cylinder block, allowing metal-to-metal contact without a gasket; and a heavier-proportioned cylinder head. New valves in these engines are seated at a 30-degree angle (formerly 45 degrees) to reduce pounding of the valve face at the higher speeds, and are Stellite-faced for longer life.

Further information may be secured from GMC Truck & Coach Division, General Motors Corp., 660 South Blvd., E., Pontiac 11, Mich. Or use the Request Card at page 16. Circle No. 749.

Two-Way Radio Pack Set

Literature describing two radio pack sets designed for portable or fixed-station service in the construction industry is available from Link Radio Corp., 125 W. 17th St., New York 11, N. Y. These two units are essentially the same except for their frequency range and power output. The first, Type 3035, is designed for a frequency range of 30 to 50 mc and has a one-watt nominal output. The second, Type 3036, is designed for a frequency range of 152 to 174 mc on a nominal output of ¾ watt.

The literature points out that these units may be operated on completely self-contained dry battery power for portable and aviation service or in combination with an ac power adapter for fixed stations. The set is furnished complete with tubes, crystal, microphone, antenna, and batteries for operating in the field. The literature illustrates each unit and lists its principal characteristics and specifications.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 740.

A team you can trust

There's a Worthington Blue Brute team to lick every clay, rock or concrete breaking job.

These job-tested air tools give you more action for every cubic foot of air. They're as easy-handling as ever an air tool could be—and their rugged construction from special heat-treated metals gives you longest life.

Teamed up with the famous Worthington Blue Brute Air Compressor, they'll speed your work and cut your costs every time.

See your Worthington distributor who will point out the Worthington design features that guarantee more work for your money. And for bulletins, write Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, N. J.

BUY BLUE BRUTES

WORTHINGTON

H.1.8

THURMAN PORTABLE TRUCK SCALE

- Platform Lengths 18, 22, 24 & 30 ft.
- Capacities 20, 25 & 30 Ton

The Scale that can be moved from job to job

Special sizes made to meet special requirements

Wide Steel Bases—support scale — require no concrete footings. Easy-to-read chrome plated weighbeam with vital parts electroplated against corrosion.

Accurate and Portable—This scale can be transported from job to job by removing 6 nuts which hold side arms in place. The rest of the scale can be lifted as a unit. Once located, it can be readied for use in minutes.

THE THURMAN MACHINE CO.—Scale Division

156 North Fifth Street Established 1918 Columbus 15, Ohio

Make your UNDERWATER SURVEYS easier... with a BLUDWORTH DEPTH RECORDER

Write BLUDWORTH MARINE 92 Gold St., New York

Kansas City Airport In Major Expansion

Perry McGlone Co. Paves Runway Extension, Roads, Taxiways, And Hardstand at Missouri Air Terminal

• THE Kansas City Municipal Airport, normally a busy metropolitan air terminal, is even busier than usual. Major improvement work is under way. By the end of the 1951 working season, the Kansas City Department of Public Works will have finished a huge expansion program. The field as a result will be safer and more convenient for TWA, Braniff, Mid Continent, and other airlines which use the busy terminal.

Perry McGlone Construction Co. of Kansas City has the newest contract, a $1,021,972 job which calls for granular base course and 196,500 square yards of paving, among other items.

The main paving improvements consist of a 5,320 x 150-foot extension to the intersection of the runways, which will make a new runway 7,000 feet long. The job also includes perimeter taxiways 75 feet wide, and a big parking hardstand 1,020 x 300 feet in area. A perimeter road in the McGlone contract will encircle the entire field, and is being paved partly with a penetration bituminous treatment on crushed rock, and partly with 8-inch portland-cement concrete.

Pavement in the taxiways, the hardstand, and the ends of the runway extension is portland-cement concrete, 12 inches thick, unreinforced. The center portion of the runway extension, where the planes will be partly airborne, is 10-inch concrete. There is 4-inch crushed-rock subbase course under the new pavement.

Field Has Grown Fast

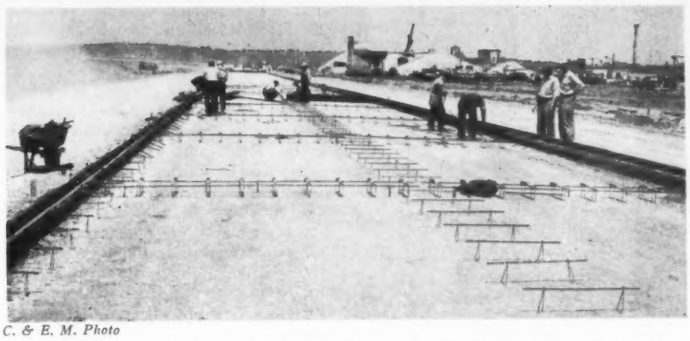
The Kansas City Municipal Airport is one of the fast-growing fields of the midwest. Not too many years ago, much of the acreage which now forms the field was sucked up out of the Missouri River by dredges, and dumped inside high earth dikes. The soil in the field is sandy, and even heavy spring rains caused no undue delay except on the days when the rains were falling.

Following the land-accretion phase, the field grew rapidly as runways were built, taxiways connections made, and administration headquarters constructed. Present construction work will round out the secondary expansion phase, but it will not complete everything that must be done. There will be a third and possibly a fourth future phase in which more runways will be built, and the field modernized still further.

Grading for the present construction aetivity was placed under contract in 1950, and the present paving contractor, Perry McGlone Construction Co., also was low bidder on that work. Under the supervision of Grading Superintendent Gordon Johnson, that part of the work was pushed through the late summer, fall, and winter months of 1950-51. Whenever the weather was favorable, men and equipment finished shaping the area to perfect grade. It was primarily a rubber-tired-scraper job, and the material was moved in a hurry.

Paving got under way May 16, 1951. General Superintendent R. D. Davis had 110 working days allowed, but he hoped to finish paving in 50 days, slightly under the halfway mark in his paving time. [Editors' Note: The Kansas-Missouri floods delayed the contract three weeks. However, the job is expected to be completed by the middle of this month.] Davis, an experienced concrete specialist from the Texas panhandle, has many of his key men with him at Kansas City. The job is being operated strictly according to union labor agreements, and is working 10

(Continued on next page)



C. & E. M. Photo

This view gives a good idea of the longitudinal and transverse dowels on the Kansas City Municipal Airport runway, and how they were supported—also of the tin keyways along the forms. Perry McGlone Construction Co. is the contractor.

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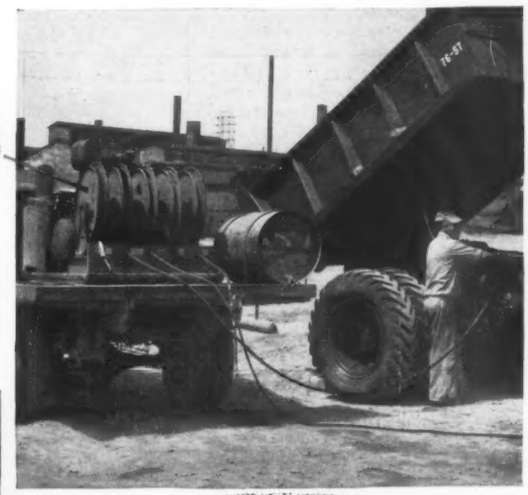

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The Mogul pump, available in pressure ratios of 40 to 1 and 8 to 1, is heavy-duty built to work shift after shift without attention.

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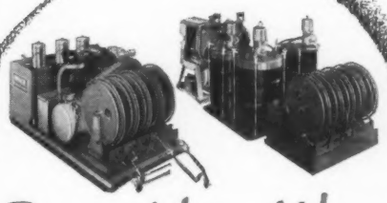

Buy either Way!

You can get Graco Convoy Lubers in either of two types: Self-contained, skid-mounted Convoy Lubers (left) are ready to slide on a truck and head for the field. New Convoy Luber catalog describes these units fully.

Job-planned Convoy Lubers (typical rig at right) are build-your-own units, designed by you to meet your own special requirements. Any combination of pumps, reels and other equipment you want. Charts in the new Convoy Luber catalog help you select the component parts. Catalog also gives suggestions for various combinations, plus information on all pumps, reels and accessories.

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C. & E. M. Photo

McGlone workmen stake a section of Blaw-Knox steel forms, as a formgrader makes trench out ahead.

Kansas City Airport In Major Expansion

(Continued from preceding page)

hours a day 6 days a week.

Generally speaking, the job is outstanding for its good organization, fast progress, and new equipment.

Several subcontractors are helping the McGlone organization. Bowen Construction Co. is doing the rock and asphalt work on the perimeter road. Buchanan Bros., trucking contractor from Kansas City, Mo., has a big hauling subcontract for dry-batch haul, concrete-aggregate delivery, and crushed-rock hauling.

Base Course Put Down

The select crushed subbase material was hauled in from the Midwest Precote quarry and dumped on the field to produce a 4-inch finished thickness. The material was bladed by a No. 12 Caterpillar motor grader to re-blend the particles, sprinkled with water, and rolled by a Bros Wobble Wheel roller as the blade laid the material down. Finish rolling was then done by a Galion tandem machine, and at the same time the ballast was tight-bladed to polish it to perfect grade. This grade was checked every 25 feet against surveyor's hubs set by an instrument.

They had a Cleveland Formgrader on the project, but as a rule it had very little to do. The material the machine dug up as it moved down a string line to excavate the form trench was negligible. The forms usually rested so solidly, with such firm bearing all across the base, that mere staking with steel pins was all that was necessary. No tamping was usually done.

Davis made 12-inch forms out of the 7,500 feet of 9-inch Blaw-Knox sections by bolting a 3-inch timber to the base of each section. The forms were set to make 25-foot standard airport strips. Pouring sequence consisted of an initial pour in the center lane, and building against it from both sides.

Fine-Grading

The base had been put down so well that very little fine-grading was necessary. However, after the forms were set in place, two tail planers were pulled down the lane. The lead machine was pulled by an Allis-Chalmers HD-5 with a Tracto-Shovel, which could move ahead with any excess material which the planer might turn up. The second planer was pulled by a Galion 5 to 8-ton roller, which compacted and rolled as it moved along. The second planer was hardly more than a template.

After the planers had finished, the grade was checked by rule and tight line to make certain that it was perfect.

Joints

Designers of the concrete pavement called for expansion joints only at a few critical points. They were eliminated from the remainder of the pavement. Every 25 feet there is a contraction joint, which consists of an asphalt-filled formed crack 4 inches deep and ⅜ inch wide. On 12-inch pavement, the steel dowel bars which transfer the load at these points are 1¼ x 18-inch. They are 1 x 16-inch in the 10-inch and 8-inch slabs.

The center of each 25-foot strip is also split by a longitudinal joint, formed by a Flex-Plane strip and open joint filled with asphalt. The bars along this joint are ⅝ x 30-inch. All dowels, including those in the contraction joints, are supported on steel wire chairs, which stick into the subgrade.

The construction joint between pavement lanes is a ½-inch-wide keyway, formed by patented steel strips pinned to the subbase. These strips did not bolt to the forms. The tie bars along this joint were bent over so they would lie flat in the keyway while the first strip was being built.

Paving Goes Rapidly

Paving was already moving along at a fast clip when CONTRACTORS AND ENGINEERS MONTHLY visited the project only a week after paving had begun.

C. & E. M. Photo

A Pitman Hydra-Lift mounted on a Ford truck loads heavy steel airport forms.

At that time only one paver was at work. It was a Koehring 34-E Twinbatch machine. But Davis had a 34-E Rex double-drum machine in the yard, putting on the finishing adjustments so it, too, could join the big Koehring machine.

(Continued on next page)

"...ENGINE STILL IN EXCELLENT CONDITION AFTER 7,000 HOURS' OPERATION THANKS TO TEXACO URSA OIL X**"

Taken down after 7,000 hours of rugged service in a rock quarry, this Caterpillar Diesel D-7 bulldozer engine was in excellent condition. Piston rings were all free, wear was so negligible that the crankshaft was reinstalled without any work having to be done on it. *Texaco Ursa Oil X*** was used exclusively in this record achievement.

*Texaco Ursa Oil X*** is detergent and dispersive; it keeps engines clean ... free from harmful carbon, gum and sludge. This, plus a high resistance to oxidation keeps rings free, ports open, valves functioning properly for better compression and combustion. *Texaco Ursa Oil X*** assures full protection for bearings ... less wear ... reduced maintenance costs and fuel consumption.

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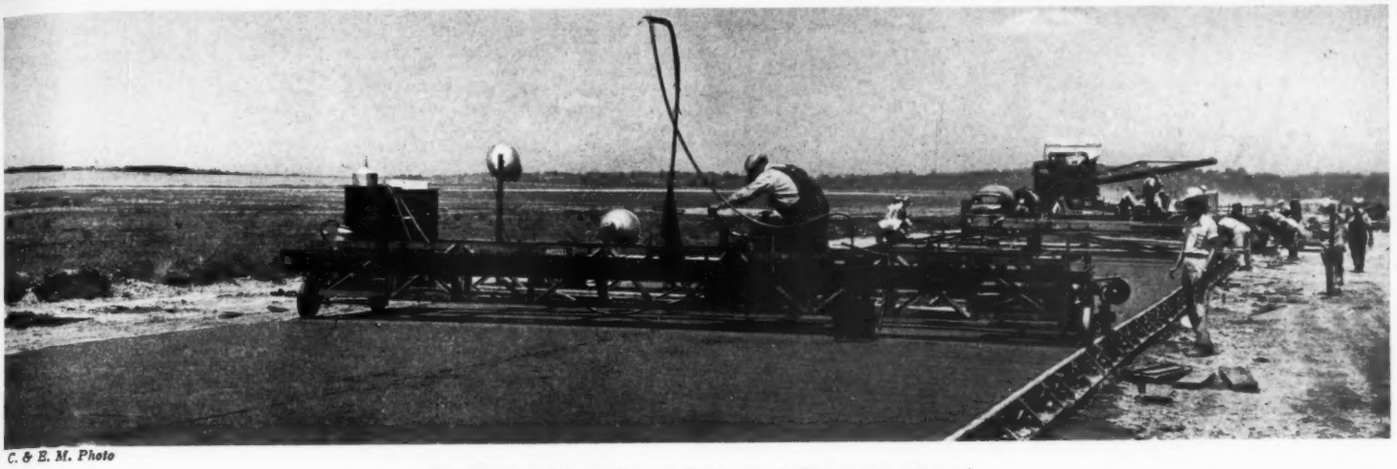

C. & E. M. Photo

A Flex-Plane machine applies membrane cure to the runway pavement.

When both pavers were in the lineup, one machine, the 34-E Twinbatch, moved forward on the subbase alongside the pouring lane; its skip facing the direction of the pour. This machine was expected to place about 55 per cent of the total yardage. Following it closely was the Rex machine. Its skip faced in the opposite direction, and this machine backed up to follow the Koehring paver. It mixed and placed the remainder of the concrete.

Paving machines in the lineup, in their working order, included a Jaeger concrete spreader, a Jaeger-Lakewood Type X diagonal-screed finishing machine, a Flex-Plane machine for center-joint installation, a Koehring mechanical float finisher, and a Flex-Plane mechanical spray machine.

Mixing water for the pavers came from a field hydrant, and was transferred to the pavers via two water tank trailers which the machines pulled along. Five 1,000-gallon tank trucks were available for water hauling and sprinkling.

As the pavers dumped the fresh concrete on grade, the finishing machine vibrated it thoroughly. There was a full-width Jackson tube surface vibrator on this machine, and Jackson stinger vibrators at each side took care of the form edges. A 37.4-cubic-foot batch was handled by the pavers.

Finishing consisted of mechanical processes as much as possible. Some long-handled bullfloating was necessary, some pointing up around the edges of the forms, and some joint dressing after workmen on bridges cut the contraction joints. The final finish was pulled on by a long canvas belt.

According to Davis, one of the most useful machines on his job was a small Ford-truck-mounted Pitman Hydra-Lift. This machine has a hydraulic-operated boom, and a small Tulsa winch to raise the hoist line. Davis used it to pull whole form sections, pins and all, at once. The machine then loaded them on the flat bed of the truck, where they could be moved ahead to the next day's work. It saved many a man-hour of back-breaking work, because the 9-inch forms with timbers bolted to them were extremely heavy.

A total crew of 95 men has been at work on the paving, including everybody but truck drivers. When both pavers were working, Davis expected to place about 200 cubic yards an hour continuously for 10-hour runs.

The concrete was cured by applying a membrane seal through the Flex-Plane machine. Air entrainment was insured by a Darex dispenser on top of each paver.

Batching Facilities

The best batching site was on the field, away from any railroad, so the various batch-plant components were set up practically in the center of the work. A batching capacity of about 150 batches an hour was available.

There was a Johnson 2-compartment rock plant for weighing out the two coarse sizes of aggregate. The sand batcher was the same type of plant. Cement was dispensed by a Johnson 200-barrel plant, and a Butler 400-barrel batch plant was also in process of erection when the job was visited. A Butler cement unloader transferred the

(Concluded on next page)

...reports Ben Malang, *(right, in photo below)*
General Superintendent,
Chandler Materials Company,
Tulsa, Oklahoma.

Three Other Texaco Cost-savers

1. *Texaco Marfak*—Tough, adhesive and cohesive, assures longer life and lower maintenance costs for chassis parts. Over 400 million pounds of Marfak have been sold!
2. *Texaco Marfak Heavy Duty*—Greater protection and longer life for wheel bearings . . . no seasonal change required.
3. *Texaco Track Roll Lubricant*—Reduces wear and lengthens life on crawler track mechanisms.

Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

Kansas City Airport In Major Expansion

(*Continued from preceding page*)

cement from railroad cars to transfer trucks, which delivered it to the batch silos. Lone Star bulk cement from the Bonner Springs, Kans., plant was used.

Rock aggregates were trucked in from Kansas City commercial plants. Unloading and charging cranes included a Koehring 1½-yard clam, a 1½-yard Northwest, and a ¾-yard Northwest. The aggregates came in three sizes: 1½ to ¾; ¾ to No. 4; and No. 4 to No. 200 (sand).

The Buchanan trucking firm used a fleet of Fords. Each batch truck hauled two batches, which they delivered at high speed to the pavers.

Close to Kansas City equipment distributors in case of a breakdown, the contractor was in an excellent position to make the most of every hour. Superintendent Davis wasn't missing out on that opportunity, either. Many paving

C. & E. M. Photo

Concrete Foreman W. V. McDaniel talks shop with McGlone's General Superintendent R. D. Davis.

shifts saw near-100 per cent effective working time, as all the key people combed and traveled the area to make certain that every operation was meshing perfectly. It was a matter of making sure the forms were 1,000 to 1,400 feet ahead, that the fine-grade was finished, the contraction-joint and other dowels set, and cement ordered for the next day's run.

Personnel

For the Kansas City Department of Public Works, Reed McKinley is Director. J. E. Maring heads up the engineering organization with Ronald White and Stanley Palmer assisting. A. L. Swank is Resident Engineer.

Perry McGlone, President of the construction company which bears his name, is in general charge of all construction operations. D. B. Leach is Construction Engineer, and R. D. (Ray) Davis is General Superintendent.

Key field people at this important airport project include Dick Mudge, Office Manager; Harry Hass, Coordinator; Bill Cheney, Subgrade Foreman; A. F. Rust, Finegrade Foreman; Ace Gillette, Steel Foreman; W. V. McDaniel, Concrete Foreman; Guy McDaniel, Finishing Foreman; R. L. Wade, Curing Foreman, and Laurence Williamson, Batch Plant Foreman. Hugh McCarthy is Master Mechanic, and Charles Senzee is in charge of the cement unloading.

Pavement Marking

Highway Research Board Bulletin No. 36 includes a report of the Committee on Roadway Pavement Markings and two papers which were presented at the Thirtieth Annual Meeting of the Board in January, 1951.

The report is by the Committee Chairman, Dr. A. R. Lauer, Professor of Psychology, Iowa State College. It indicates the areas of interest in which the Committee was active during 1950.

The first paper, "Method and Application Procedures for Pavement Marking", is by Charles R. Waters, District Engineer, State Department of Public Works, Buffalo, N. Y. It summarizes the results of a survey in which highway departments of all 48 states and several foreign countries participated. They all completed a questionnaire covering such aspects of pavement striping as types and cost of paint, application and protection methods, etc.

The second paper included in the bulletin is by G. W. Ashman, of The New Jersey Zinc Co., Palmerton, Pa., sponsored by the Committee on Paints and Marking Materials. It is entitled "Present Preferences for Traffic Paint". Replies to questionnaires from 34 states and 175 traffic-paint manufacturers are compiled into an up-to-date and representative canvass of opinions and preferences. The returns indicate a great increase in the use of retro-reflective road markings during 1950 as compared with the previous year.

Bulletin No. 36 is obtainable from the Highway Research Board, Division of Engineering and Industrial Research, National Research Council, Washington 25, D. C. The price is 45 cents.

Concrete-Pipe Forms Offered in Many Shapes

An illustrated circular describing concrete-pipe forms available in varied shapes is offered by Quinn Wire & Iron Works, 1645 Twelfth St., Boone, Iowa. Supplementing the company's catalog on standard concrete-pipe forms, it describes shapes such as flared-end culvert sections, arch culverts, cattle passes, manhole forms, concrete-post forms, and other specials such as T's, reducers, elbows, etc.

The circular points out that standard forms for making concrete pipe 10 inches in diameter and up, in any length, are also available; and that Quinn equipment can be supplied for pipe with plain ends, tongue-and-groove joints, bell-and-spigot joints, and various special joints.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 720.

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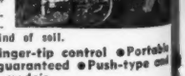

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BACHTOLD BROTHERS, INC. Forrest, Illinois

The 6-V Greasemaster is a portable high-pressure unit that takes its power directly from the piece of equipment it is lubricating.

Lube Gun Powered By Engine Battery

A portable high-pressure grease unit that takes its power directly from the machine or piece of equipment which it is lubricating has been developed by G & T Industries, Inc., 1428 Barwise, Wichita 2, Kans. The 6-V Greasemaster draws sufficient power from any standard 6-volt battery to provide line pressures up to 3,000 pounds.

The unit is completely portable and is supplied with 25 feet of high-pressure hose to eliminate moving the supply pail from one place to another while greasing. Full swivel joints between hose and control valve permit contact with out-of-the-way fittings. G & T points out that the Greasemaster may be used with any standard 50-pound grease pail and is guaranteed to handle all liquid or semiliquid greases. An automatic pressure switch controls the motor, permitting an adjustable line pressure of 500 to 3,000 pounds. A gage shows the working pressure. A booster control valve permits pressures up to 12,000 pounds maximum for working on frozen fittings.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 708.

Rocket Firing Needs Quick-Move Scaffold

Speed of erection and removal are essential in a rocket-firing scaffold. For a recent rocket test, the Air Force required extreme portability and extreme rigidity when placing an order for the scaffold.

Ezebilt scaffolding, made by Universal Mfg. Corp., Zelienople, Pa., was used for this operation. Outriggers at the bottom of the scaffold gave the rigidity needed, and casters on the bottom panel legs, the required portability. In consequence, it was possible to clear the scaffold away in 15 minutes after the personnel had worked up to the last second before firing. Ezebilt scaffolding was used with four 52-foot towers tied together with standard Ezebilt braces at 90 degrees to each other.

U. S. Air Force Photo

Time is of the essence when firing a rocket—and that goes for the scaffold, too. Ezebilt scaffolding used in this Air Force test was speedy to erect, mobile, and could be cleared away in 15 minutes after firing.

M. B. Garber Gets NPA Post

The National Production Authority has appointed M. B. Garber, Director of Sales of The Thew Shovel Co., Lorain, Ohio, as Director of the Construction Machinery Division of NPA. Mr. Garber had been an on-call consultant to this division for 6 months previous to his appointment.

During World War II, Mr. Garber was head of the Construction Machinery Division of the War Production Board.

Data on Packaged Steam

A packaged steam generator can reduce cost all along the line, according to a catalog prepared by York-Shipley, Inc., 254 Jessop Place, York, Pa. "It is easier to install and costs less to operate," the company claims. The booklet gives details on the company's boilers.

The York-Shipley Steam-Pak generator is available in 15-hp units and up, burning a number of types of fuels. It is laboratory, field, and factory-tested, the catalog says, to provide packaged heat, hot water, and power. Cross-section photographs show how it operates, supplementing data on the safety controls, combustion chamber, target ring, forced-draft blower, etc.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 785.

Do your sealcoating and ice control jobs the fast easy Swenson way. Spreads any width or amount desired.

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Better for structural concrete

Duraplastic is so often *specified* for structural work because it gives a more plastic, more cohesive mix that is more workable and easy to place. Duraplastic air-entraining portland cement needs less mixing water for any given slump.

Makes more durable concrete

Water-gain and segregation are minimized by the air-entraining feature of Duraplastic. The finished concrete is thus fortified against the effects of freezing-thawing weather and the surface appearance is improved.

YET DURAPLASTIC* COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

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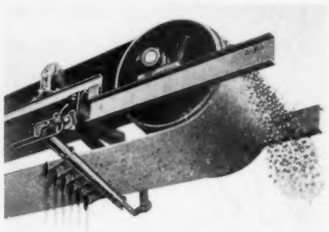
Spring-Type Cleaner For Conveyor Belts

A spring-type conveyor-belt cleaner has been turned out by Stephens-Adamson Mfg. Co., Aurora, Ill. Self-aligning spring-steel wiper blades, set perpendicular to the belt surface, but diagonal to belt travel, wipe the belt clean and dry as it passes. Spring arms supporting the blades maintain a uniform pressure on the belt and allow the blades to ride easily over obstructions such as belt splices, the company says. Dribble from the cleaner falls directly into the discharge chute at the head end of the conveyor.

Since the wiper has an independent mounting assembly, it can be adapted to fit existing conveyor installations.



The Stephens-Adamson conveyor-belt cleaner consists of spring-steel wiper blades set perpendicular to the belt surface, but diagonal to belt travel. They wipe the belt clean as it passes.

Adjustments and replacements can be made from either side without interrupting conveyor operation.

Further information on these conveyor-belt cleaners may be obtained from the company by requesting Bulletin No. 651. Or use the Request Card at page 16. Circle No. 774.

Roebling Promotes Barney

The appointment of James C. Barney is announced as Assistant Sales Manager for the Wire Rope Division of John A. Roebling's Sons Co., Trenton, N. J.

Mr. Barney, who replaces the late George B. Stoess in the firm's home office at Trenton has been associated with Roebling for 26 years. Since 1947 he has combined the post of sales representative for the California oil fields with that of assistant manager of the Los Angeles district office.

Convention Calendar

October 16-17—Virginia Road Conference
Annual Meeting, Virginia Highway Conference, Virginia Military Institute, Lexington, Va. R. P. Ellison, Executive Assistant, Virginia Department of Highways, 1221 E. Broad St., Richmond 19, Va.

October 22-25—ASCE Meeting
Fall Meeting, American Society of Civil Engineers, Hotel Statler, New York, N. Y. Don P. Reynolds, Assistant to the Secretary, 33 W. 39th St., New York 18, N. Y.

October 23-26—AASHO Meeting
Annual Meeting, American Association of State Highway Officials, Fontenelle Hotel, Omaha, Nebr. A. T. Lobdell, Chairman, Committee on Reservations, Department of Roads and Irrigation, State House, Lincoln, Nebr.

October 29-31—NLGI Meeting
Annual Meeting, National Lubricating Grease Institute, Edgewater Beach Hotel, Chicago, Ill. Harry F. Bennetts, Executive Secretary, 4638 J. C. Nichols Parkway, Kansas City 2, Mo.

October 30-31—Concrete Institute Meeting
Regional Meeting, American Concrete Institute, Sheraton Hotel, St. Louis, Mo. General Chairman, A. C. Weber, Director of Research in Sales Engineering, Laclede Steel Co., St. Louis, Mo.

Jan. 8-10, 1952—National Constructors Meeting
Annual Meeting, National Constructors Association, Waldorf-Astoria Hotel, New York, N. Y. J. F. Pritchard, President, National Constructors Association, 50 E. 41st St., New York 17, N. Y.

Jan. 21-24, 1952—ARBA Meeting
Annual Meeting, American Road Builders' Association, Rice Hotel, Houston, Texas. Lt. Gen. Eugene Reybold, Executive Vice President, International Bldg., Washington 4, D. C.

Jan. 27-31, 1952—AED Meeting
Annual Meeting, Associated Equipment Distributors, Stevens Hotel, Chicago, Ill. P. D. Hermann, Executive Secretary, 360 N. Michigan Ave., Chicago 1, Ill.

Feb. 10-14, 1952—National Sand & Gravel and National Ready Mixed Concrete Assns.
Annual Conventions, National Sand & Gravel Association and National Ready Mixed Concrete Association, Stevens Hotel, Chicago, Ill. V. P. Ahearn, Executive Secretary, 1325 E St., N. W., Washington 4, D. C.

March 19-21, 1952—N.Y. Highway Engineers
Annual Convention, New York State Association of Highway Engineers, Hotel New Yorker, New York, N. Y. Convention Secretary, Harry Spitzer, Box 38, State Office Bldg., Babylon, Long Island, N. Y.

April 1-4, 1952—New York Safety Meeting
Annual Convention, Greater New York Safety Council, Hotels Statler and New Yorker, New York, N. Y. Paul F. Stricker, Executive Vice President, 60 E. 42nd St., New York 17, N. Y.

April 7-9, 1952—Lubrication Meeting
Annual Meeting and Lubrication Show, American Society of Lubrication Engineers, Hotel Statler, Cleveland, Ohio. W. F. Leonard, Secretary, 343 S. Dearborn St., Chicago 4, Ill.

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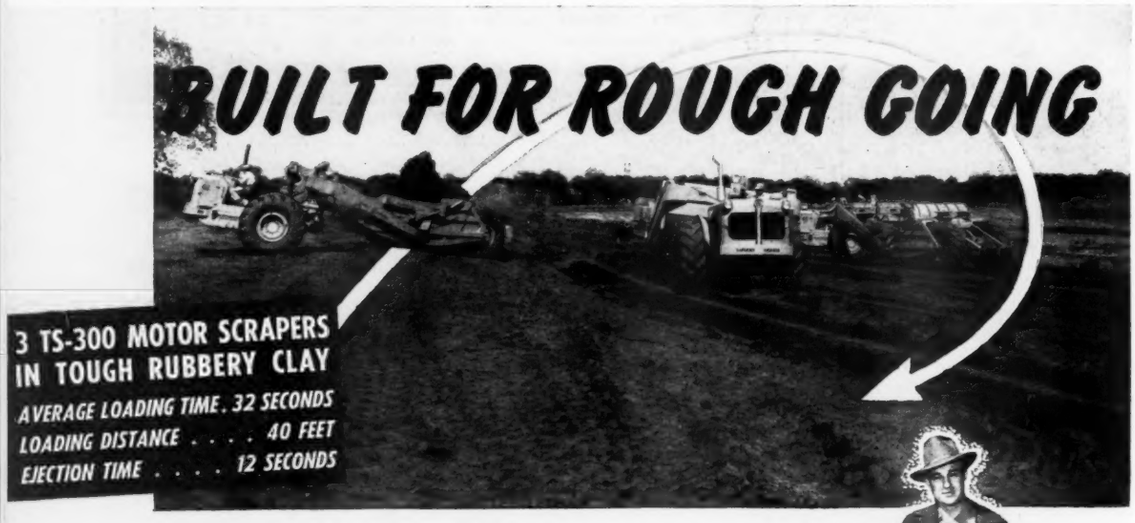
This literature may be obtained from the company by requesting Bulletin No. H-6, or by using the Request Card at page 16. Circle No. 776.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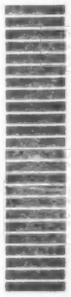

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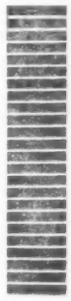

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How America Is Using Prestressed Concrete

First U. S. Conference on New Material Reveals Its Use for Pipes, Bridges, Pavements, Piles and Other Structures

By MICHAEL A. SPRONCK,
Associate Editor

(Photo on page 1)

• SIX HUNDRED men representing all phases of the construction industry met in shirtsleeve sessions last August and listened to an "advance guard" describe new, practical uses for prestressed concrete. Current material shortages, and the possibility of building better, safer structures at lower cost focused attention on the First U. S. Conference on Prestressed Concrete. The conference clearly showed that American engineers, contractors, and manufacturers have accepted Europe's challenge and are adapting this new development to our way of doing things. Some 44 down-to-earth reports were given during the 3-day meeting sponsored by the Massachusetts Institute of Technology and six cooperating organizations.

There is little question that prestressed-concrete structures are feasible; the point is—are they economic? The conference answer was a tentative *yes*, demonstrated by examples of structures recently built in the United States and by an increasing number of tests performed here. Each speaker told about the work he or his company is doing to adapt prestressing to American methods.

Tanks, pipes, bridges, pavements, piles, and other structures all got their play. The speakers' topics ranged over design, testing, fabrication, production control, materials, field placement, labor, patents, codes, and research. And if the speaker missed some point, or ventured to tread on controversial ground, the listeners were quick to challenge him during the heated discussions following the prepared talks. Though most of the men agreed on the potentialities of prestressed-concrete construction, not all were sold on its immediate use. "How about high labor costs, patents on end anchorages, problems of making and placing stiff mixes, and the lack of acceptable codes to go by?", they asked. Some of the answers were given, some were not; but the pooling of knowledge which took place at this conference was the starting point for what may be the century's most significant advance in construction.

Why Prestressed Concrete?

Lead-off speaker L. H. Corning, Manager of the Structural and Railways Bureau of the Portland Cement Association, tackled the big question in everyone's mind, "Why is prestressed concrete suddenly so important?" The answer, he said, lies in three answers to three fundamental questions—Does it result in a better structure? Is it more economical? Does it save critical material during an emergency, or conserve natural resources over a long period? A *yes* to any one of the three justifies its importance and its use for any particular structure under consideration.

A prestressed structure is by definition better, he said, for it imposes internal stresses, before working loads are applied, in such a way as to lend a more favorable state of stress when these loads come into action. Examining specific benefits of a prestressed

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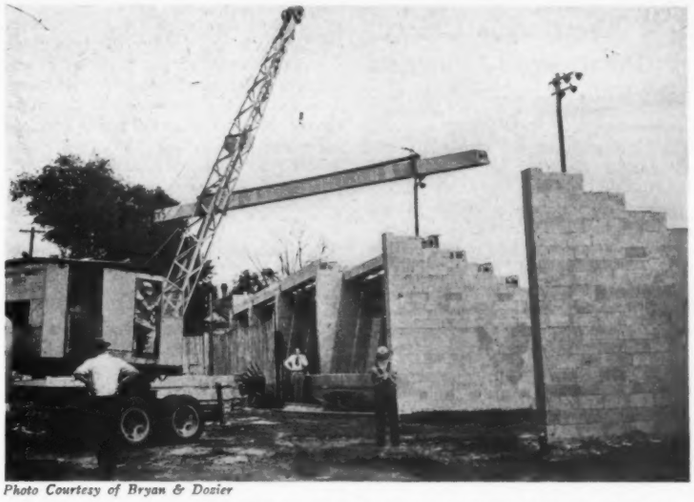

Photo Courtesy of Bryan & Dozier

A light truck crane can handle these prestressed-concrete beams designed by Bryan & Dozier for Fayetteville Stadium in Tennessee. They are made of standard precast-concrete blocks, using Roebling cables for the prestressing.

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How America Is Using Prestressed Concrete

(Continued from preceding page)

member or structure, Mr. Corning pointed to its weather-resistant and waterproof qualities, to simpler design, to thinner webs using the efficient I and T-sections, and to decreased beam depths that afford greater clearance. You can design a prestressed member that is rigid under working loads, yet flexible under overload, he said. These attributes, among others, indicate that the prestressed structure is a better one.

Is it more economical? Mr. Corning pointed out that concrete can be reduced to two-thirds and steel to one-fifth that required for comparable reinforced-concrete designs. The smaller sections typical of prestressed concrete mean less contact area for forms. Light weight reduces form support and precasting can eliminate it entirely. There are also important associated economies for certain types of structures, he said. At grade separations, saving even a few inches in deck depth lowers costs of fills, approaches, retaining walls, drainage, right-of-way, and appurtances. This can be a significant amount.

Labor and erection costs will be reduced by the ingenuity of the American contractor and engineer to match the materials saving, he said. These savings, and others that will come with experience in the field, mean that prestressed concrete *can* be more economical in many cases, and certainly competitive in others.

The savings in materials, said Mr. Corning, mean that we can channel more critical supplies to urgent needs and conserve natural resources which we are beginning to realize are far from inexhaustible. He recommended establishing a broad code for prestressed-concrete construction—a code that would guide development along acceptable working standards, yet allow improvement and improvisations to effect further economies.

Circular Structures

Curzon Dobell, Vice President of Preload Enterprises, Inc., pointed out that so much has been written on linear prestressing that we tend to forget that the largest use of prestressed concrete has been for circular structures—with design and methods of construction developed almost exclusively by Americans. Some 700 tanks, 300,000 feet of pressure pipe, and 300 spherical shell roofs have been built or are under contract in North America. He pointed out that there is a far greater contrast between linear and circular structures than between pre-tensioning or post-tensioning. On circular structures, he stated, only 12 man-hours of labor are required to install one ton of prestressing wires, compared to 152 man-hours per ton on the Walnut Lane Bridge.

Mr. Dobell traced the history of circular prestressing and explained design considerations and construction problems. The Merry-Go-Round winding machine was the answer to the problem of friction in tightening the wire around the walls. It also mechanized the job, cutting costs. Comparisons between prestressed and reinforced-concrete designs for tanks demonstrate tremendous savings in materials. Mr. Dobell told his listeners of a case where a heavy-duty bulldozer had been used to spread fill over a 90-foot-diameter underground prestressed tank dome that was only 2 inches thick.

Vehicular tunnels, oil tankers, and dry docks are some of the newer applications of circular prestressing, he said. City engineers, however, may be most interested in the new pilot tank for the storage of liquid oxygen at *minus* 380 degrees F. If this tank is successful it may lead to the storage of municipal liquefied gas supplies in insulated prestressed tanks that will accommodate the tremendous thermal-contraction stresses occurring at low temperatures.

The two papers which followed Mr. Dobell's highlighted the importance of prestressed-concrete pipe in this country, again pointing out that in this work American methods are superior to the European.

The "Self-Mending" Bridge

"European prestressed-concrete designs may be daring, but they are not reckless", said C. C. Zollman, of Howard, Tammen, Needles & Bergendorff, in his review of practices abroad. His

(Continued on next page)

A 40-foot prestressed-concrete girder breaks finally during tests The Austin Co. ran to determine applications for industrial buildings. The girder took four times its design load.

Photo Courtesy of The Austin Co.

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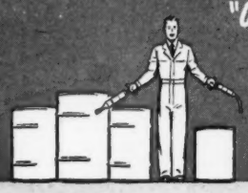

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illustrated case histories showed that prestressed concrete is simply another material, sound in construction and flexible in application. Prestressing can be applied to various forms of construction, he said—conventionally reinforced, precast, prefabricated elements, and cast-in-place concrete. Many existing structures show how it was used to solve tough problems introduced by local site conditions. One dramatic case illustrates its flexibility in coping with unforeseen job problems.

A 416-foot prestressed-concrete box-girder bridge was selected to replace a bridge over the Sclayn River, Belgium, which was destroyed during the war. Existing piers were reconstructed to fit the new 2-span continuous-girder bridge. To provide a 75-foot-wide navigation channel under the bridge during construction, the two spans were supported differently. Forms for the channel span rested on steel girders supported by wooden piers in the river. The other span used simple steel-pipe scaffolding for support.

All went well through the placing of the forms, the prestressing wire, and the concrete. Then it happened, just before prestressing. A tremendous transverse crack developed in the concrete near the mid-river pier. It ran across the full width of the bridge, increasing in size, and opening to about 5/16 inch at the top. The bridge was literally broken in two.

The main cause was settlement of the channel span, principally due to shrinkage of the wooden supports of the temporary piers and deflection of the steel girders. At first there was some justifiable concern over the unhappy turn of events, but it was soon realized that the crack did not endanger a prestressed structure. When the prestressing force was applied, the crack closed to all but 1/16 inch. Small crushed particles kept it from closing further. A cement grout injected into the crack bonded the two edges.

As Mr. Zollman said, ". . . only in a prestressed-concrete structure is settlement of centering or falsework of no serious consequence. Only in prestressed structures can unforeseen settlement be coped with so simply and adequately."

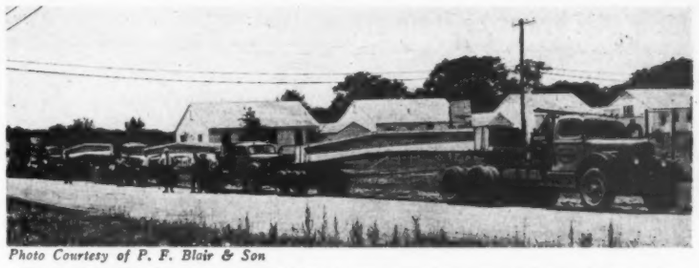

Photo Courtesy of P. F. Blair & Son

Standard trailer bogies transport 40-foot prestressed concrete girders, designed by P. F. Blair & Son, from the prefabricating plant to the building site in Tulsa.

Problems at Walnut Lane

The design of the Walnut Lane Bridge is so well known by now that S. S. Baxter of Philadelphia's Department of Public Works could afford to skip it in his talk and get right into some of the problems faced on the job. He quite readily admitted that if "second choices" were possible, they might do some things differently.

Specifications called for a 2-inch-slump concrete—very dry compared with usual mixes in this country—and for a 5,400-pound strength in 28 days. Placing a dry mix in an I-beam cross section is tough enough, but in this case it had to be pushed through a 7-inch web filled in part with cable ducts for the prestressing wires. Large voids appeared in two of the early girders. (From the slides it looked as if you could put your foot in a couple of them.) As a result of requests from the field, slump was gradually increased to 2½, 3, and 3½ inches. This made it easy to place the concrete but led to other difficulties. The 5,400-pound strength originally attained in 15 days now took the full 28. Girder production took twice as long, since prestressing could not be started until the concrete had attained the required strength. "Next time we'll keep a 2-inch slump", said Baxter, "and find ways of placing it or else widen the webs intentionally in the design."

Walnut Lane proved that costly hand labor can be cut down. At first the prestressing cables were made the European way: threading each wire through 64-hole spacer plates 3 feet apart along the length of the cable. American workmen improved on this by designing comb-type spacers. A 16-slot horizontal comb and a 3-prong vertical comb allowed 4 wires to be placed at one time, with significant savings in labor cost.

Precast Concrete Costs Less

R. H. Bryan, consulting engineer from Nashville, Tenn., described some of the work they are doing down there building low-cost prestressed structures. His opening remarks on the relative costs of precast concrete versus poured-in-place concrete really hit home. The comparison is significant to all groups in the industry—contractors, architects, consulting engineers, and equipment manufacturers.

Taking prices in Tennessee as an example, Mr. Bryan pointed out that in the past 15 years the cost of poured-in-place concrete on bridge superstructures has advanced 230 per cent, while the cost of concrete-block units has increased only 10 per cent. Since both represent finished concrete requiring the same materials, rising costs, alone, do not explain the divergence in final costs.

Here is the case as he put it to his listeners. A concrete pour on the average bridge today is just about the same as it was 30 years ago, the most important innovations being the vibrator and the rubber-tired wheelbarrow. Even so, the rate of placing, where materials are mixed on the site, remains about the same. With hourly wages up and efficiency at the old levels, the result is a rapid rise in cost. Concrete-block machines, on the other hand, produce 750 units per hour instead of the 350 delivered 15 years ago—using 3 men instead of 5. Here rising costs are offset by an increase in production and efficiency.

(Continued on next page)

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How America Is Using Prestressed Concrete

(Continued from preceding page)

Contractors and engineers, Mr. Bryan concluded, must take advantage of this American trait of making things easier and faster by machinery, if the rising costs of construction are to be curbed.

Prestressed Bridge

Other papers at this session showed marked interest in the application of prestressed concrete for bridges. C. L. Johnson, of Clark, Johnson & Anderson, gave a progress report on the construction of a bridge in Oakland County, Mich., using precast I-shaped blocks. The builder tried pouring the vertical joints between blocks, instead of "buttering" each block as it was placed; this insures a more exact beam length and eliminates the use of masons, said Mr. Johnson. A 60-foot prestressed-concrete test girder showed full recovery and a repeated stress pattern when loaded to twice the design load.

J. C. W. Carroll, President of Prestressed Concrete Corp., Kansas City, Mo., provided full details, along with color slides, on the construction of a footbridge across the Arroyo Seco. It was significant that Califorina Division of Highways engineers installed recording devices on this modest-size structure so they could periodically check theory with practice.

Construction Problems

Judging by the interest of The Austin Co., industrial buildings may be the next frontier in prestressed-concrete construction. J. K. Gannett, Vice President and Director of Engineering and Research, told about the exploratory work the company is doing in this field. There are many problems in adapting prestressed construction to industrial buildings, but the war effort may mean the choice between building problems and no buildings, he said.

Structural problems are just one facet of the over-all considerations. Facilities for plant operations run from 40 to 70 per cent of the total cost; this must be kept in mind before accepting a new building method, Mr. Gannett said. Another problem is provision for future expansion.

If prestressed-concrete members are cast on the ground, or off the site, there are high erection costs. The field labor will cost about twice as much as that required for a steel building, he said. The choice of working in mud up to your knees, or designing floors to support moving-equipment loads, is another problem. So is protecting concrete against the cold. Mr. Gannett wondered if transit-mix companies can supply low-slump concrete. If not, designs will have to be modified. A possible solution is standardization of cross sections to justify precasting on a factory basis. It would cut the cost of forms and could be done within certain length ranges by varying the number of prestressing wires.

A. T. Waidelich, Vice President and Manager of Austin's Research Division, described some experiments the company had just completed. Using an 8-bag mix of early-strength concrete with a 2-inch slump, they got 6,000, 7,000 and 8,000-pound concrete in 3 days. Three beams of varying designs were tested to destruction.

Commercial Buildings

A foresighted engineering-contracting company in Tulsa, Okla., can boast of two of the earliest buildings using prestressed-concrete members. This new material has advantages for small structures as well as large, P. Blair, Jr., told the conference group. A number of prestressed-concrete beams and girders in lengths of 28 to 50 feet were used for an elementary school in Tulsa. These showed a definite cost advantage over ordinary precast concrete, and also competed with precast joists and lightweight roof slabs, or steel-bar joists and wood decking, according to Mr. Blair.

Thirty-foot prestressed joists were used for an office and machine shop in Tulsa. The shortage of sheet steel made it necessary to use wood for the forms, but in spite of high-frequency external vibration, the forms have been used 19 times, to date, and are still holding up well, he said. The joists were of a modified H-section, 18 inches deep. A single 1-inch galvanized bridge strand with swedged end fittings, made up by the John A. Roebling's Sons Co., served as the prestressing reinforcement. "Using a 60-ton Simplex center-hole jack and a shop-made frame, we can prestress each beam in less than 10 minutes", Blair said.

Transporting members in this size range, from casting and prestressing area to the job site, was no problem. Blair used semitrailer trucks or standard truck-tractors and trailer bogies. "Erection is simple too", he said. In one instance three 6½-ton RC girders and twenty 2-ton prestressed joists were erected in 4 hours by a 5-man crew and one crane.

Elastic Floor Mats

Since there is no perfect joint in floor-slab construction, we must seek other solutions, L. Coff, consulting engineer of New York, told his audience. One is to eliminate joints by constructing an elastic mat which will slide on the subbase—as in the construction of a warehouse in Chicago. A film accompanying the talk gave dramatic proof of the flexibility of this type of design. It showed a 10-foot-span prestressed-concrete slab, only 1½ inches thick, undergoing repeated deflections of 4 inches or more under shock loading.

Highway Pavements

Bengt F. Friberg, Vice President of Granco Steel Products Co., suggested in his paper that prestressing techniques be developed for highway pavements to eliminate many transverse joints, reduce cracks and moisture in the subgrade, and permit the use of thinner pavements. Joint spacings of 400 to 600 feet with 4 to 6-inch pavements may be possible with adequate

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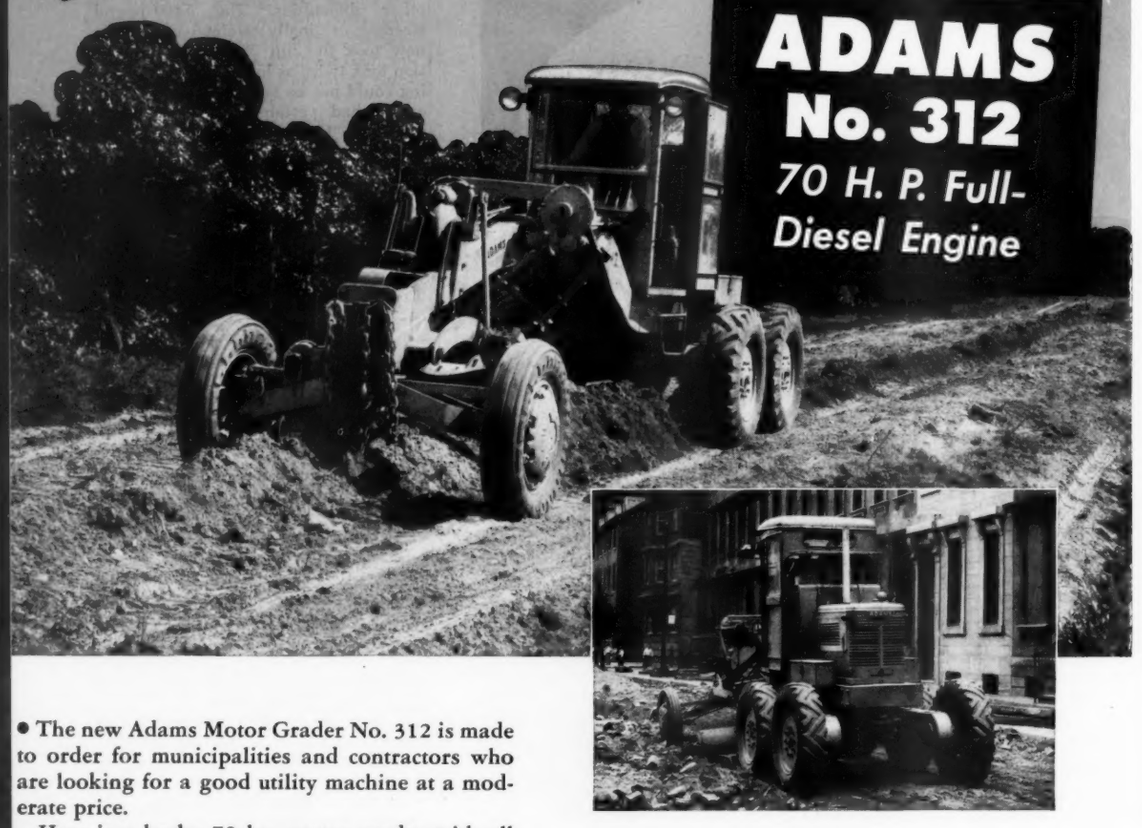

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J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, IND.

Make your next motor grader an ADAMS

Photo Courtesy of Raymond Concrete Pile Co.
This 36-inch-diameter prestressed-concrete hollow pile gives very satisfactory service, Raymond Concrete Pile Co. reports. A special bonnet is required for driving it.

prestressing, he said.

His report analyzed in detail the various stresses induced in pavements of different thicknesses. It was interesting to note that the increase in load stress for thinner pavements is offset to some degree by a decrease in temperature stress. Mr. Friberg pointed out that there is still a great deal we must learn about slab movement, subgrade restraints, and pavement deflection at the edges and joints before we can intelligently apply prestressing to road construction.

However, methods of prestressing highway pavements, Mr. Friberg felt, are not beyond the scope and ability of American engineers and contractors. A number of ways have already been devised and applied with varying success. Pneumatic cells installed in the transverse joints are able to apply prestress forces of 200 to 300 psi, he said. This method was used by the speaker many years ago for stress-curing. It is also possible to fill expansion joints with expanding concrete to obtain prestress. Data on the restraint stress in concrete not free to expand make it obvious that these forces can be formidable. Their control would be necessary, by using adjacent strips of limited-strength concrete as a safety valve, or some other means of stress relief. The more conventional methods of pretensioning and post-tensioning with high-strength steel wires are also possible, of course, he said. Work of this kind has been tried experimentally in England, France, and Germany.

Mr. Friberg presented drawings and fairly detailed descriptions of the methods in use. He also visualizes adapting pre-tensioning to American methods, using tractors, wire-feed platforms, wire splicers, tensioners, spacers, and cutters—all moving along the road at normal paving speeds.

The advantages of prestressed-concrete pavement? Fewer transverse joints and load-transfer devices, less concrete, reduced maintenance, and longer road life, he said.

Prestressed-Concrete Piles

Significant advances have been made by Raymond Concrete Pile Co. in developing prestressed-concrete piles. A. E. Cummings, Director of Research, described the company's experimental work and some of its installations. Raymond has tried both pre-tensioning and post-tensioning.

There are two problems with conventional RC piles, Cummings said—shrinkage cracks, and cracks induced by bending stresses during handling. Raymond wanted to see if it could lick these problems by prestressing. Also important for any pile-making method is fast commercial production with rapid re-use of forms. Mr. Cummings reported that prestressing can eliminate the cracks and that you don't need very much prestress to do it.

First trail was a 14-inch-square pile, 55 feet long, reinforced with ten 0.34-inch wires. The pile was tested for stiffness and handling. Raymond wanted to see if the prestressed pile could

(Concluded on next page)

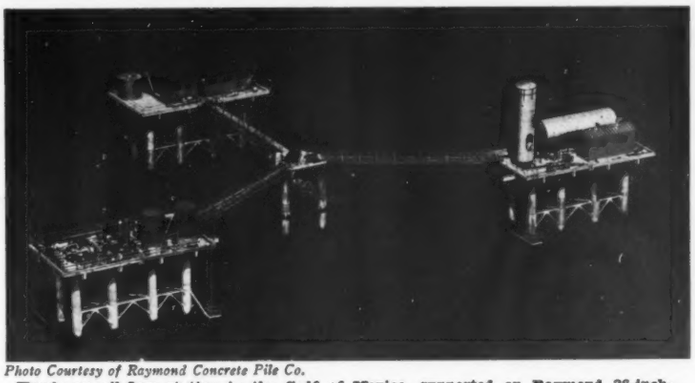
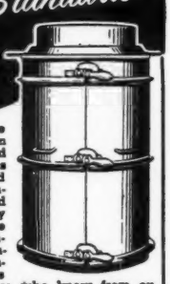


Photo Courtesy of Raymond Concrete Pile Co.
Here's an oil-flow station in the Gulf of Mexico, supported on Raymond 36-inch-diameter prestressed-concrete piles. These off-shore stations quarter crews, store a small supply of crude oil, and pretreat it.

THE "Quinn Standard" FOR CONCRETE PIPE



The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

Quinn Heavy Duty Pipe Forms

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

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Job Tickets tell the story...*more hours of work each day...more work per hour...lower operating costs...lower maintenance costs*...it all adds up to *bigger profits for you.*

Yes, *QUICK-WAYS make faster profits*—give you fast truck speed between jobs—eight money making attachments—fast working speeds—4 models from 3 to 10 ton crane capacity.

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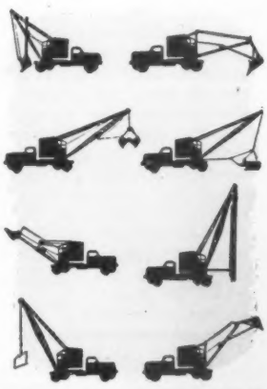

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Please send me complete details on "QUICK-WAY" truck shovels—four different models for large jobs and small.

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How America Is Using Prestressed Concrete

(Continued from preceding page)

be handled without cracking. It passed with flying colors, so the company took on a more extensive program that included driving.

Four different piles were made, both solid and hollow-core types, with various reinforcement. "The point was to see how little reinforcement we could get along with", Cummings said. The conventonal precast piles then being used on a job were 18 inches square, 75 feet long, with four 1-inch-square bars. The prestressed piles were made the same size, using 20, 16, 12, or 8 wires for reinforcement. All but the 20-wire pile had a 10-inch-diameter hollow core. The wires were stressed to 70,000 psi, giving a compressive stress of 200 to 400 psi in the pile itself. These piles were successfully driven to final resistances of 15 to 45 blows per inch with a single-acting steam hammer having a 7,500-pound ram falling 3 feet.

Raymond also tried hollow sections of centrifugally spun pile with post-tensioned cables. These piles can be made in diameters of 14 to 36 inches, using 8, 12, or 16 cables of 12 No. 6 wires each. On one job the company made 16-foot sections of piles with a 36-inch outside diameter and a 4-inch wall. Twelve cables of 12 wires each were used to tie six of these sections together. This large-size pile had to be hung outside the leads and required a special bonnet for the driving head. A single-acting steam hammer with a 10,000-pound ram falling 39 inches was used to drive the pile to a final resistance of 10 blows per inch. The pile proved perfect in tests; settlement was only one-fourth that allowed by normal building codes.

Mass-Produced Units

K. P. Billner, President of Vacuum Concrete, Inc., delivered an excellent paper on mass production of prestressed-concrete units. He pointed to the special advantages of factory-made concrete products and described the various systems for mass production in England, Belgium, France, Germany, Sweden, and the U. S.

Proving that mass-produced prestressed-concrete units are not quite a novelty in this country, D. O. McCall, Chief Engineer of the Basalt Rock Co., cited their early use on the west coast. The company got into the field a few years ago, seeking new outlets for units which could be produced on an automatic block machine. Roof and floor slabs, wall panels, and bridge decking are a challenge to this field, he said. Prestressed precast concrete units can eliminate forms and shoring, reduce pouring and curing time, decrease the dead weight of the member, and cut down the amount of job-site labor required, he claimed.

For this reason the company developed the Strestcrete system, using fairly standardized block sections joined together and prestressed to required lengths or panel sizes. Contact faces of the blocks are precision-ground to insure uniform bonding. Threaded reinforcing rods are placed in the side splines of the blocks and through washers at the end of each panel to prestress the entire unit. The amount of prestress is, of course, moderate with this mild steel, but is more than sufficient for its purpose. The slabs or panels are easily transported to the location by truck and erected by crane.

Average panels are 4 feet wide, but they have been made in sizes 8 x 32. Grout keys the slabs together. The steel washers at the end of each panel provide convenient lifting points and are used to connect or weld the panels to the building frame. Though Mr McCall didn't say it, this seems to be a big step in the direction of lower construction costs.

Materials, Design, Research

Unfortunately space limitations do not permit a resume of the many fine conference talks on materials, design, and research. These reports covered all aspects of the subjects and offer much of interest in this new field. We can only suggest that the reader concerned with these topics obtain a copy of the proceedings when published.

Summary

The conference represented a great forward stride in the advancement of a technique which may effect radical changes in the construction industry. If adapted to American methods, prestressed concrete can offer designs that are stronger, safer, more efficient, and more attractive—at a cost equal to or less than that of present materials.

The responsibility for the closing summary of the First U. S. Conference on Prestressed Concrete fell to Rear Admiral J. F. Jelley, Chief of the Navy's Bureau of Yards and Docks. It was appropriate that he should be chosen since the Bureau is the architect, engineer, and owner's representative for the Navy's shore construction. Design criteria, specifications, control of material, construction, and maintenance are all under the technical management of the Bureau.

Admiral Jelley pointed out that the cliche "In Europe labor is less critical than material" is no longer a valid argument against the use of prestressing here. The situation in this country is changing, he said, and materials are becoming difficult to obtain.

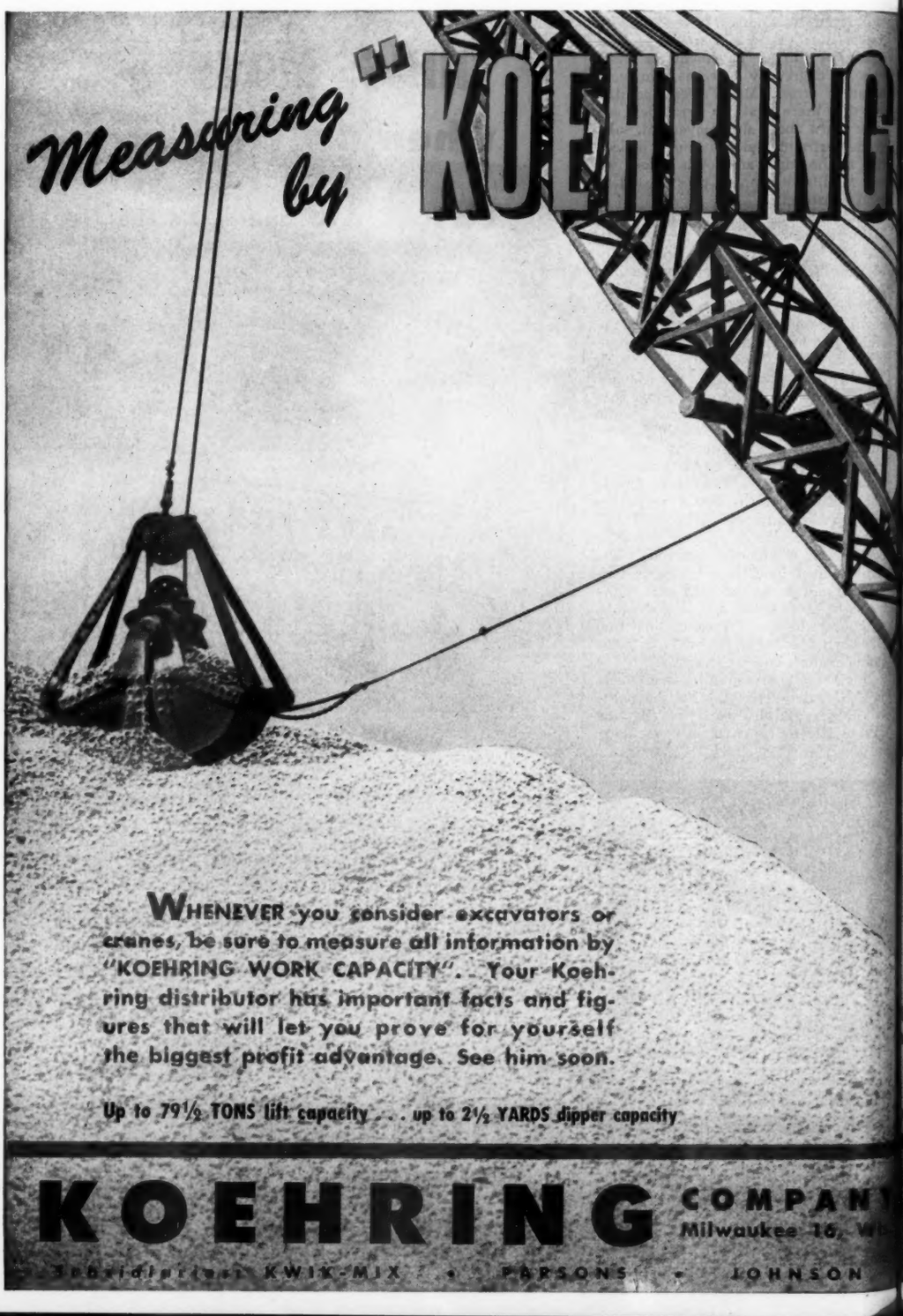
Reviewing the wealth of information given in the talks, he stressed the importance of providing a definite system of coordinating and disseminating information on prestressed concrete. M. I. T. is to be congratulated for its foresight in arranging this conference as the first step, he said. He also recommended the adoption of modern production methods and more basic research to improve the quality of materials and the efficiency of design.

"This conference", Admiral Jelley concluded, "has given me the feeling that we are on the threshold of a new era in construction very similar to the time 50 years ago when reinforced concrete was introduced. Unquestionably we are in the initial stage of developing an important construction material, one whose ultimate development may exceed our present expectation... we cannot help but be stimulated by this challenge."

Thor Cincinnati Transfer

Independent Pneumatic Tool Co., Aurora, Ill., manufacturer of Thor portable power tools, announces the transfer of its Cincinnati branch to a new building at 3726-28 Floral Ave.

The new headquarters offers factory branch service facilities, including trained service mechanics, a complete stock of replacement parts, and accessories for all Thor tools.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WHENEVER you consider excavators or cranes, be sure to measure all information by "KOEHRING WORK CAPACITY". . Your Koehring distributor has important facts and figures that will let you prove for yourself the biggest profit advantage. See him soon.
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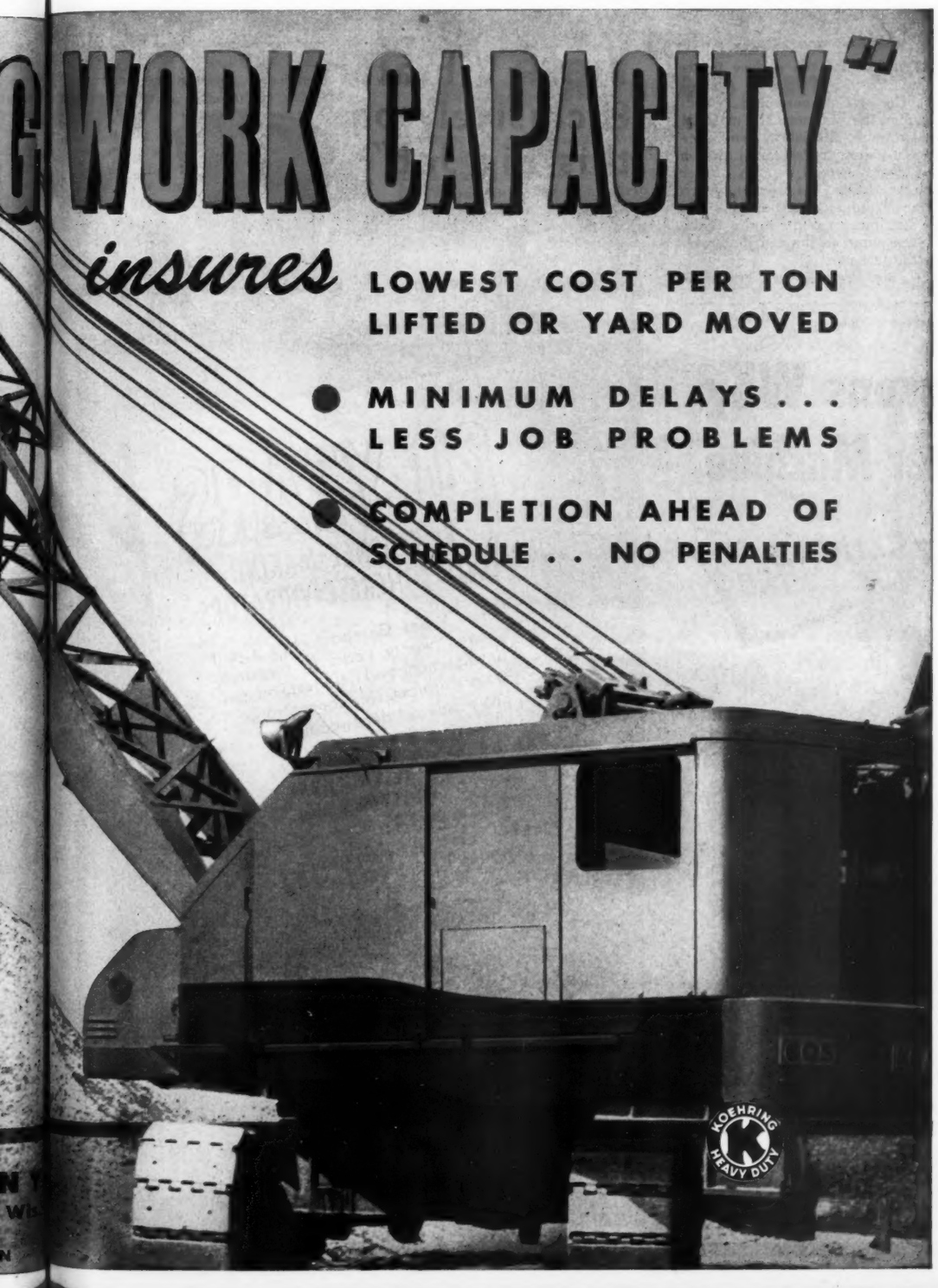
Ten Jacks Hold Up Sagging Bridge Pier

A pier of the Peace River Bridge in the Yukon was sinking and tilting. How to support it until the undermined foundation could be replaced?

The first step was to drive a cofferdam around the pier so a reinforced-concrete subfoundation could be laid. Then the coffer was allowed to fill with water and divers went down to put ten Simplex-Jenny hydraulic jacks at the base of the pier on the new subfoundation. They arranged them in banks of five each, with a hand pump and reservoir for each bank hose connected in manifold; in this way all five in each bank took the same load. The coffer was then pumped dry and the concrete was poured around the jacks, which were protected with forms. For 60 days the jacks sustained a load of 800 tons. They were recovered when they had served their purpose, and sent back to the factory for reconditioning after such punishment.

Here is one bank of the Simplex-Jennies which supported the sagging pier of Peace River Fridge while the foundation was replaced.



New Handbook On Stainless Steels

A handbook on stainless steels has been prepared by Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa. It is available without cost to users of the heat and corrosion-resistant metals.

In its 120 pages, the cloth-bound volume discusses approximately 40 different types of Allegheny stainless steel, covering each from standpoints of analyses, fabrication, heat treatment, and special conditions of service. A selector table containing about 30 types, including both nickel-chromium and straight-chromium steels, lists about 40 properties broken down into the general classifications of physical data, electrical properties, heat resistance, working and treating temperatures, mechanical properties, and creep strength. A second group of tables in the first chapter list the corrosion resistance of the steels to the various media, including organic substances, acids, and salts. Subsequent chapters discuss each type of stainless separately and in more detail.

Copies of the book may be obtained from Allegheny Ludlum by request on your business letterhead.

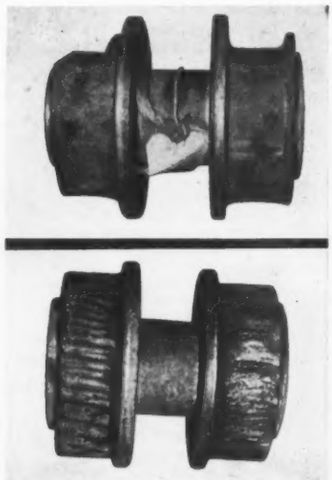
How You Can Rebuild Cast-Iron Top Rolls

During the past year there has been a considerable increase in the use of welding for rebuilding and hard-facing worn tractor parts such as rollers and idlers. This has been due partly to the shortage of replacements and partly to the fact that everyone is seeking economies in the care and maintenance of expensive equipment.

The Stoody Co., Whittier, Calif., has recently issued an illustrated folder describing the rebuilding and hard-facing of top carrier rolls. In it, Stoody engineers point out that although the carrier roll looks much like the larger roll on which the tractor runs, it is usually made of cast iron rather than steel. For rebuilding these cast-iron top rolls, Stoody recommends the manual application of an electrode, such as Stoody 1027, with high impact strength and resistance to abrasion.

On a tractor or other crawler equipment operating in mud, the top carrier rolls often freeze up; by the time they are freed, the track has worn a flat spot. The proper hard-facing resists this wear materially. If rebuilt with a suitable electrode, wear is far less, Stoody says, and the cost of labor and materials is considerably below the replacement price.

Copies of this Stoody folder on rebuilding top carrier rolls may be secured direct from the company, or by using the Request Card at page 16. Circle No. 746.



Before and after views of a tractor top carrier roll: worn—and then rebuilt with Stoody 1027 electrode

Road Shoulders Surface-Treated

Maintenance in Maryland Includes Double Bituminous Surface Treatments on Many Miles of Shoulders

C. & E. M. Photo

This Littleford 2,100-gallon distributor mounted on a White truck heads a fleet of 7 aggregate trucks on the U. S. 40 project.

• RECOGNIZING the need for wide highway shoulders with a strong and durable surface, the Maryland State Roads Commission is emphasizing this year a maintenance program that includes bituminous surface treatments over many miles of shoulders on its most heavily traveled highways. A typical example of this safety measure in good road upkeep is the improvement of the 10-foot gravel shoulders along U. S. 40, a dual roadway, on the busy stretch northeast of Baltimore running up to the Delaware line.

This portion of the divided highway carries the bulk of the heavy trailer-truck traffic between the big cities of the northeast. The 10-foot gravel shoulders along the outside of each dual lane are sufficiently wide and stabilized to provide parking room for the largest of vehicles. The double bituminous surface treatment is being applied to keep these shoulders intact, with a smooth and firm surface adjacent to the pavement.

This year the Elkton maintenance district, located in Cecil County in the northeast corner of the Old Line State, expects to complete 145 miles of surface treatment work. One of its routine shoulder operations, as described here, covers a 3-mile section of U. S. 40 between its intersection with State Route 7 and the town of Northeast. The dual 24-foot pavements are separated by a depressed center parkway. Last year the concrete pavements were covered with asphaltic-concrete hot-mix. The shoulders treated this year are along the outside of each dual roadway.

Asphalt and Slag

RC-3 asphalt for the surface treatment was furnished by the Asphalt Service Co. of Baltimore, Md., which also applied the bitumen. The material was delivered to the job in two Fruehauf 4,000-gallon trailer tanks after a 35-mile over-the-road haul. A burner on each tank heated the bitumen, which was transferred to a Littleford 2,100-gallon distributor mounted on a White truck. The pump on the distributor effected the transfer.

No. 4 slag, ¾ to ½-inch gradation, was used for the cover coat. It was supplied by the Arundel Corp. of Baltimore. Some of the aggregate was shipped by barge to a dock at Northeast near the head of Chesapeake Bay. From there it was trucked a short distance to the job. The rest of the slag was hauled by truck 42 miles from Sparrows Point, Md., where the steel mill turning out the slag is located. Eastern Contractors, Inc., of Baltimore, a trucking concern, was engaged to deliver the slag.

(Concluded on next page)

"We Specified VIBER Vibrators Exclusively on this Big Job"

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EXPERIENCE MAKING
ONLY CONCRETE VIBRATORS
Viber Company has spent over twenty years in research, development and field tests on concrete vibrators. This concentration has produced dependable vibration equipment
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1 of 10 Reasons Why UNIT is a Better Machine

All operating clutches on UNIT Cranes and Shovels are disc-type and completely interchangeable — a very desirable feature when replacements are necessary. Engaging pressure is uniformly distributed over the entire frictional surface. Engaging surfaces are flat and polished for greater endurance, longer life, and better performance. Loads are picked up smoothly and evenly, without any tendency to grab or self-energize. Clutches are mounted on the high-speed countershafts, instead of directly to the drum shafts. This feature lends itself to a more compact design, smoother operation, maximum power, and greater accessibility for making adjustments or repairs. This method of clutch installation is another example of the superior design that is a part of every UNIT crane or excavator.

UNIT 1014 Truck Crane

The newly designed Unit 1014 Truck Crane is packed with quality and ready to prove it. Perfectly balanced, it has modern hook-roller construction. A separate engine powers the upper structure, and can be either gasoline or Diesel. The truck engine supplies power in a straight-line, through drive to the tandem rear axles.

6th of a series of ten ads describing outstanding UNIT features.

UNIT CRANE & SHOVEL CORP., 6309 W. Burnham St., Milwaukee 14, Wis., U.S.A.

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A flat, cleared area at the side of the road was available for storing the aggregate and parking the asphalt trailer tanks. A Barber-Greene loader filled the state-owned trucks with slag from the stockpiles for spreading on the shoulders. A fleet of 7 trucks of various makes, averaging 4½ tons a load, was used in spreading the slag.

Surface Treatment

In preparation for the bituminous surface treatment, the shoulders were first given a light sweeping with a broom drag, equipped with fiber bristles, and pulled by a truck. The bitumen was put on in two separate applications of 0.5 gallon to the square yard for each shot. A 10-foot spraybar at the rear of the distributor covered the entire width of shoulder. The RC-3 was applied at a temperature of 165 degrees F, and covered at once with the No. 4 slag, 25 pounds to the square yard.

The slag was put on with a Buckeye spreader box, blocked off to the 10-foot width required, and attached to the rear of each aggregate truck in turn. The slag cover was immediately rolled in by three 3-wheel rollers—first in line being an 8-ton Huber, followed by a pair of 10-ton Hercules. Each shot of bitumen was covered with the same amount of slag. The usual procedure was to put on the entire first application, going over the shoulder on one side of the road and then crossing over for the other side, and following up with the second treatment.

The string of aggregate trucks kept close behind the distributor, running in forward gear until it was time to turn around and back over the bitumen with the spreader box at the tailgate. A pair of flagmen, one at each end of the operation, kept traffic moving briskly over the inside lane; only a slight interruption occurred as a truck was turned around on the pavement to receive the spreader box.

Personnel

The average surface-treatment crew included 14 men — foreman, 7 truck drivers on the slag, 2 on the brooming, a spreader-box man, a loader operator, and 2 flagmen. Working a 12-hour day in the summer, such a force averaged 2½ miles of shoulder work, on both sides of the road, per day.

The operations covered here were under the supervision of Rolph Townsend, District Engineer, and J. J. Ward, Resident Maintenance Engineer of the State Roads Commission with headquarters at Elkton. Golder Bland was Maintenance Foreman of the road crew. William F. Childs, Jr., is Chief Engineer of the Maryland State Roads Commission, and P. A. Morison is Assistant Chief Engineer—Maintenance.

Belanger Upped at Pioneer

A. J. Belanger has been appointed Assistant Sales Manager of Pioneer Engineering Works, Minneapolis, Minn. Mr. Belanger has filled the post of Bituminous Sales Engineer for Pioneer since 1948. Before that, he spent 6 years in the Engineering Department, where he was engaged principally in the design and development of the company's continuous-process hot-mix central plants.

C. & E. M. Photo

A Barber-Greene loader fills a Federal truck with slag aggregate on the highway-shoulder surfacing job in Maryland. In the rear, one of 2 Pruehauf tank trailers feeds bitumen to the distributor.

TIMKEN® bearings help new Gar Wood scraper make time on new turnpike

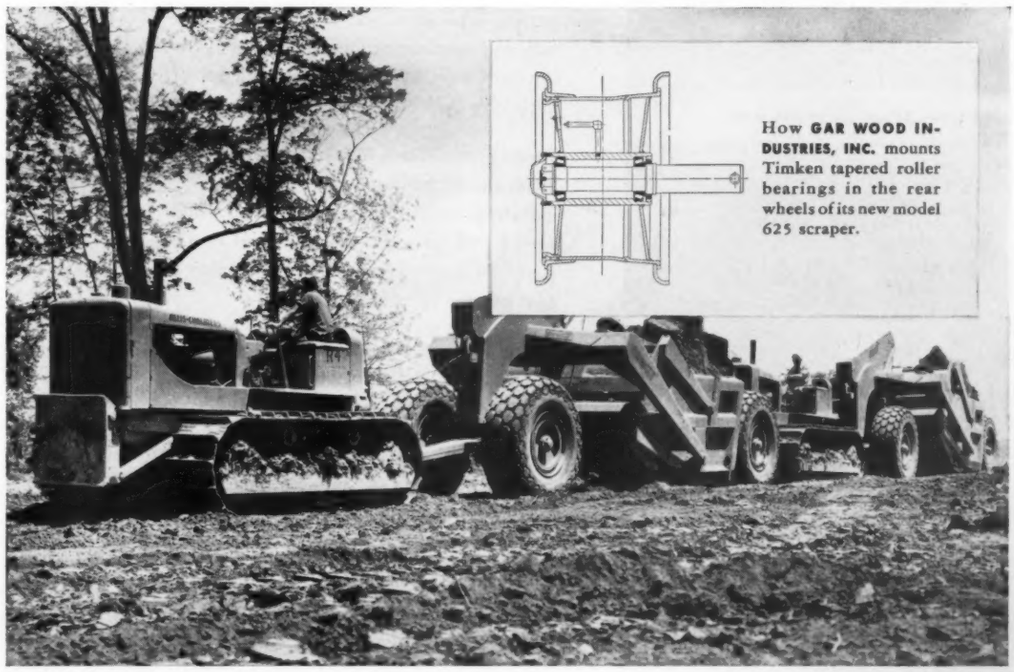
SHOWN here at work on the Western end of the Pennsylvania turnpike extension, these new model 625 Gar Wood scrapers are a big help in keeping the project moving along on schedule. Each one can dig, carry and dump a load of 25 cubic yards of dirt. Timken® tapered roller bearings in the wheels carry the heaviest loads, help keep the scrapers on the job with minimum time-out for maintenance and repairs. Pulling and pushing the scrapers are giant Allis-Chalmers torque converter tractors—each equipped with 50 Timken bearings in the tracks, final drives, bevel gear shafts plus other important applications.

Because of line contact between the rollers and races, Timken bearings have extra load-carrying capacity. The tapered construction of Timken bearings enables them to take both radial and thrust loads. Wheels and shafts are held in rigid alignment, reducing wear on moving parts.

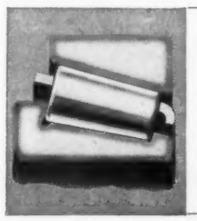
The incredibly smooth surface finish and true rolling motion of Timken bearings practically eliminate friction. And more effective closures are possible because Timken bearings keep housing and shaft concentric. Lubricant is kept in; dirt and grit kept out.

No other bearing gives you all the advantages you get with Timken tapered roller bearings. Make sure they're used in the construction equipment you buy; specify bearings with the trade-mark "Timken" for the equipment you build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **GAR WOOD INDUSTRIES, INC.** mounts Timken tapered roller bearings in the rear wheels of its new model 625 scraper.

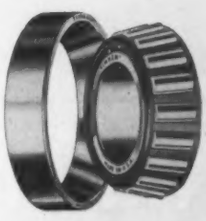


GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer. The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TAPERED ROLLER BEARINGS

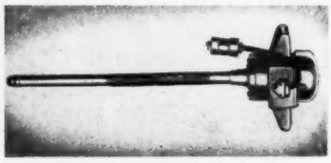


NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Laboratory Vibrator Now Has Rubber Tip

A laboratory concrete vibrator with a rubber tip has been announced by Viber Co., 726 S. Flower, Burbank, Calif. The rubber tip enables it to be used on moisture-absorbent form-lining materials and plaster-of-paris molds in laboratory and experimental work with a minimum of damage to the forms.

Model 11 is 27 inches long and has an outside diameter of 1 5/16 inches. It is powered by a Universal ¼-hp electric motor and has a vibrating speed of over 10,000 rpm. It weighs approximately 15 pounds net. The manufacturer recommends it for vibrating test cylinders or beams, both laboratory and field. It may also be used in making concrete products, small-scale hydraulic structures, and in experimental work. The rubber tips are easy to replace.



Viber Co. now makes a rubber-tipped concrete vibrator for laboratory use. It is the Model 11.

Further information can be secured from the company, or by using the Request Card bound in at page 16. Circle No. 759.

Stabilizing Gravel Roads

Gravel replacement on secondary roads can be an expensive proposition, according to the new 8-page folder prepared by Seaman Motors, Inc., 282 N. 25th St., Milwaukee, Wis. It shows, however, how the cost can be reduced by using the Seaman Pulvi-Mixer. "A quick simple operation with the Pulvi-Mixer can save $150 to $500 worth of gravel per mile", the booklet says. A picture story shows how a job was done in South Dakota.

The booklet also discusses such things as who can be sued for an accident caused by loose gravel, the cost of an accident, the cost of excessive vehicle wear when traveling over unstabilized gravel roads, and the maintenance cost of these roads. It also suggests other uses for the Seaman Pulvi-Mixer in highway work.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 788.

Goodrich Sales Personnel

Two personnel changes are announced by The B. F. Goodrich Co., Akron, Ohio. Edgar T. Gregory is Manager of Flat Belting Sales, in place of A. Clarke Mack, who has resigned; and Donald E. Schlemmer succeeds Gregory as Operating Manager of the Industrial Products Sales Department. Mr. Gregory has been with the company for 7 and Mr. Schlemmer for 15 years.

WHAT'S BEHIND THE EUCLID NAME?

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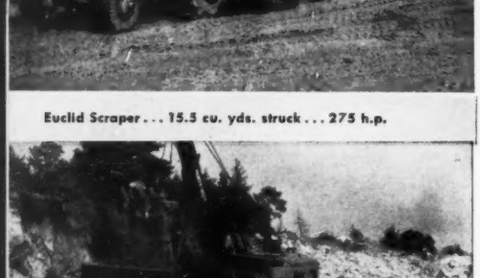

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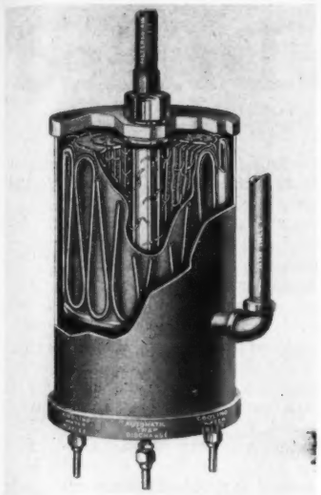


The Condensifilter removes water, oil, sludge, and other foreign materials from compressed air.

Dirt, Water Removed From Compressed Air

The Model B Condensifilter, a device which removes water, oil, sludge, and other foreign materials from compressed air, has been developed by Hankison Corp., 252 Renton Bldg., 1501 Beaver Ave., Pittsburgh 33, Pa. It combines a dehydrating device, a mechanical filter, and a self-purging trap in a single unit. It measures 15 inches high x 9 inches in diameter, and has a capacity of 30 cfm at 100 psi.

In operation, air is admitted through the side, directed through the condensing section where it is dehydrated, and then passed through the mechanical filter. The total drop in pressure across the Condensifilter is less than 2 psi at 100-psi working pressure. The condensing unit, which removes water in both entrained and vapor states, is composed of a series of copper coils through which cold water flows. In passing through this section, the air is reduced in temperature to within 2 degrees of the cooling-water temperature; then when the air warms to atmospheric temperature, a spread between temperature and dew point is effected.

The filtering unit is made of five hexagonal filter chambers in parallel, each chamber wrapped with seven layers of canton flannel. The unit is said to be easily removed for cleaning. It provides over 4 square feet of filtering area and removes pieces as small as 1.0 to 2.0 microns. Removal of one 1½-inch SAE nut dismantles the entire filter for cleaning and service. The removable filter cartridge is cleaned by immersing it in a suitable solvent.

When requirements are greater than the rated capacity of a single unit, Condensifilters may be installed in parallel. The same applies when uninterruped service is desired, for the parallel arrangement allows one unit to be cleaned while the other carries the load.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 727.

Steel Panel Scaffolding

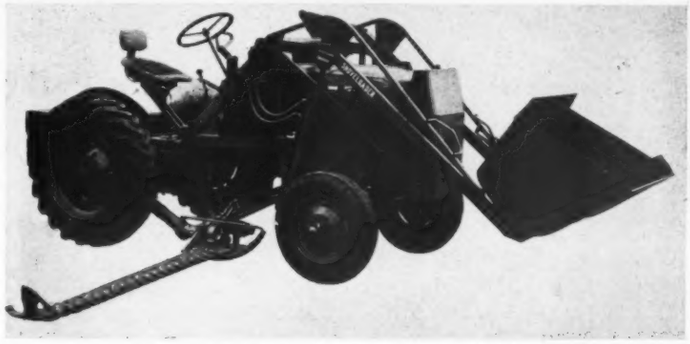
A 4-page folder describing Ezebilt scaffolding and some shortcuts and tricks of unusual scaffolding applications is available from Universal Mfg. Corp., 133 North St., Zelienople, Pa. It covers the Gravity Lock mechanism and other features of the system, pointing out that the simplified basic components are all interchangeable.

Some of the special tricks illustrated and described include racking down (reducing a 5-foot panel to an effective 30-inch width for narrow places); shortening the span; tying around corners; angling the scaffold around outside or inside curved walls; and single bracing which permits use of fewer parts.

This literature may be obtained from the company by requesting Bulletin No. 130, or by using the Request Card at page 16. Circle No. 741.

New Tractor-Loader

A Model 3-B Shoveloader for Case VAI wheel tractors has been announced by Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn. Its design permits the installation of the Case VAI-5 mower attachment without interfering with the operation of the Shoveloader. Both units operate independently of each other. The bucket is controlled by a parallelogram mechanism which automatically keeps the bucket level while raising. This design also provides controlled scooping. The bucket can be controlled independently.



Lull's new Model 3-B Shoveloader is built for Case VAI wheel tractors.

Alternate interchangeable loader attachments available for the unit are a ⅜-yard material bucket, ½-yard loose-material bucket, ¾-yard snow bucket, bulldozer, lifting crane, fork lift, and motor-driven sweepers.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 735.

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39V	1036	30x18	80	56000
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18V	1024	24x16	40	36700
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Tunnels Drilled

By RAYMOND P. DAY

• NEARLY a year ahead of schedule. That's the accomplishment of Wunderlich Contracting Co. of Omaha in connection with two of the important tunnels in the U. S. Bureau of Reclamation's Colorado-Big Thompson Project. And how 38,063 feet of underground work is moving rapidly to completion is a story of good organization, planning, and methods.

With the development work on the west-slope side of the big project almost completed, the earlier ending of Wunderlich's job will be gratifying to USBR officials. The two tunnels, Olympus and Pole Hill, are not entirely finished at this publication date. But they are a full year ahead of the 1,300-day completion schedule, based on the starting date of August 10, 1949. The two irrigation tubes, which pass under the Colorado Rockies southeast of Estes Park, will cost the Government $4,787,000 in payments to Wunderlich Contracting Co.

Purpose

Olympus and Pole Hill Tunnels are a part of the east-slope distribution system for Colorado River water under the Big Thompson project plan. Water from the Colorado River on the west slope of the Rockies is picked up by a pumping station and sent through reservoirs to the entrance of the 13-mile Adams continental-divide tunnel. When it emerges from the Adams Tunnel, the water is on the east slope of the mountains and headed down toward the rich farming country near Loveland, where it will eventually be used to supplement existing irrigation supply.

The Pole Hill and Olympus bores are but two units of a comprehensive arrangement of tunnels, canals, siphons, and power plants between the low portal of Adams Tunnel and the farmlands. At the time the water will enter Olympus and Pole Hill Tunnels, it will already have generated electric power at Marys Lake and Estes power plants. Below Olympus and Pole Hill, the water will pass through further generating plants on its long drop down to agricultural lands, which lie about 3,000 feet below the point where men dared to pierce the high Rockies to bring the water to another valley.

Long Tunnel Involved

Pole Hill Tunnel is the second-longest tunnel in the Big Thompson project, exceeded only by Adams. Pole Hill is 28,527 feet long, while Olympus is 9,537 feet. Both tunnels are horseshoe-shaped, with 8-foot bottoms and a finished radius of 9.75 feet. The concrete lining in each tunnel ranges from 5 to 10 inches thick, depending on the accuracy of excavation.

At the time the tunnels were designed and located, engineers tried to find a straight-line route through the mountain ranges near the present site. Such a location could be found, but there were other factors which influenced the present site. Most important was the element of cost, which is lower under the 2-tunnel scheme than it would have been under a single-tunnel method. At the end of Olympus Tunnel the engineers found an open spot in a tiny valley. Here, where Olympus emerged and Pole Hill started, was a common point where the work could be split up. Excavation from four headings was possible with this location if the contractor cared to work that way.

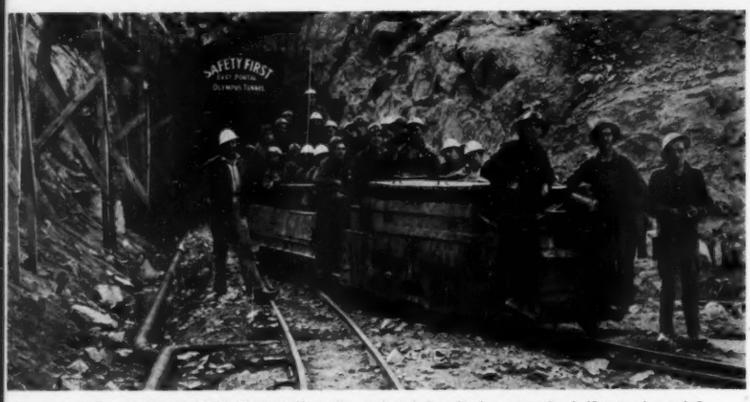
A 180-foot covered section across this little valley will connect the 11-degree 24-minute bearing variance of the two tubes. That section is also included in Wunderlich's contract.

Works Three Headings

The layout of both tunnels, with a common point located exactly right for headquarters, caused the contractor to work three headings instead of the four that were available. Olympus was excavated from the low portal nearest the common point. Pole Hill was excavated from both ends. This scheme placed the bulk of activity at the common point, so the office, shops, batch plant, and other camp facilities were set up at that location. Only the bare necessities for excavation were set up at the far portal of Pole Hill Tunnel.

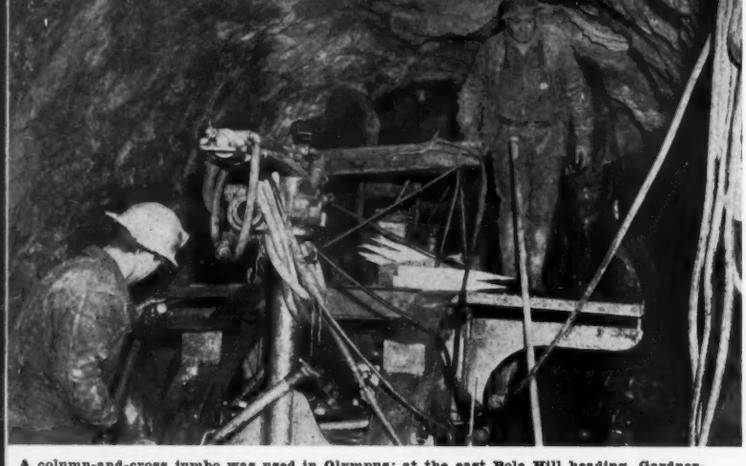
Then the Wunderlich organization brought in men who had years of underground experience to plug the key spots. T. F. Adams, General Superintendent. Gruff, grizzled Hugh Wolcott —"Muh name is 'Hardware', dammit" —Master Mechanic. F. R. Merrick, Tunnel Superintendent at the common point. Robert Silva, Tunnel Superintendent on Pole Hill's east portal. Reed Herman, Concrete Superintendent. R. H. Wilson, Office Manager. And two of the newer-type key personnel: Engineers D. P. Morris and David Pearson, both top-notch. E. B. Fontaine, Vice President of Wunderlich Contracting Co., is Project Manager.

And there were miners, and motormen, and nippers, and slugger-valve men, and a host of other craftsmen. They came in rough boots and hard hats and the clothes of *men*, men who gamble with their lives against the toughest of all construction work; men who were to pit their skill and guts against granite, pegmatite, and schist deep under the Rockies. There wasn't a necktie among the lot. Such were the

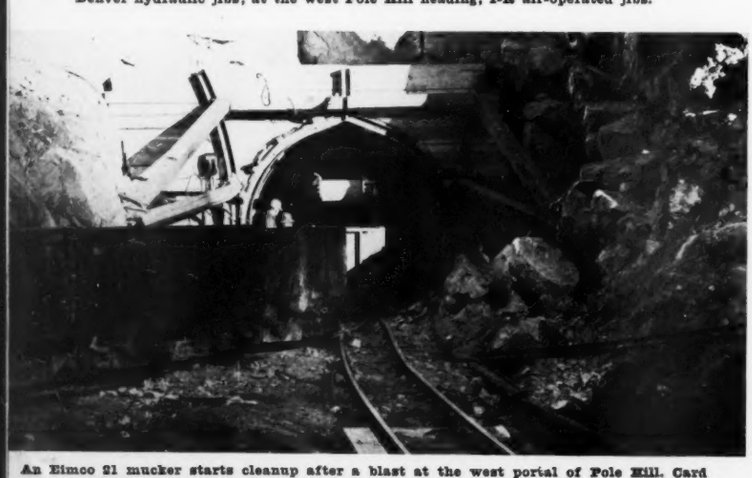


Tunnel stiffs of Wunderlich Contracting Co. get set to start a round at the east portal of Olympus Tunnel. They won't look so clean when they come out.

A driller starts a round by sinking a cut hole. An average round at the east portal of Olympus and west portal of Pole Hill was 7 feet, with 40 to 42 holes.

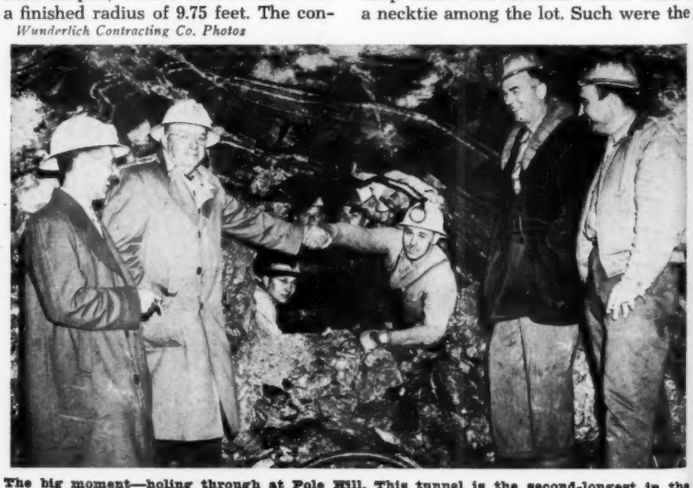


A column-and-cross jumbo was used in Olympus; at the east Pole Hill heading, Gardner-Denver hydraulic jibs; at the west Pole Hill heading, I-R air-operated jibs.



An Eimco 21 mucker starts cleanup after a blast at the west portal of Pole Hill. Card cars, pulled by Atlas and Mancha locomotives, took the muck to the disposal point.

Wunderlich Contracting Co. Photos



The big moment—holing through at Pole Hill. This tunnel is the second-longest in the Big Thompson project—28,527 feet. Olympus is 9,537.

Under Rockies

Contractor Ahead of Time on Pole Hill and Olympus Tunnels, Irrigation Tubes for Big Thompson Project

tunnel stiffs.

That gang was destined to work 15 months from the common point; 11 months from the east portal of Pole Hill. It was to drive 16,491 feet of Pole Hill Tunnel from the common point and shake hands with "them Arkansawyers" on the east side. The job was destined to have an excellent safety record, one of the best ever racked up on the Big Thompson tunnels, with due credit to Phil Denton, Safety Engineer for the Bureau of Reclamation.

Tunnel Excavation

Tunnel excavation was carried forward on a round-the-clock basis, 6 days a week. At the common point, three 1,000-cfm Ingersoll-Rand Imperial 10 compressors were set up, while at the east Pole Hill portal the compressor equipment was Gardner-Denver.

Drilling equipment consisted of Ingersoll-Rand DA-35 drifters at all headings, four per heading. The DA-35 is a 3½-inch machine. Drill steel at all headings consisted of 1080-carbon, round, hollow, crucible shaft, with Carset detachable tungsten-carbide bits. A conventional column-and-cross type of jumbo was used in Olympus Tunnel. Gardner-Denver hydraulic jibs were used with the jumbo on the east Pole Hill heading, while on the west portal of Pole Hill, Ingersoll-Rand air-operated jibs saw service.

Mucking equipment consisted of seven Eimco Model 21's at the common point, and two Eimco 40 Rockershovels at the east portal of Pole Hill. All seven of the 21's were not used simultaneously, of course. Several were extra machines. Hauling equipment consisted of 8 Atlas 8-ton battery locomotives, rated at 1,900 pounds of drawbar pull at 5 mph, and 3 Mancha mule locomotives. All cars were 92-cubic-foot Card Granby units, with a detachable dump ramp.

At the common-point headings, a 7-foot average round was removed with from 40 to 42 holes in the face of the rock heading. At east Pole Hill the round was 8 feet on an average, with 38 holes. Averaged over the job, the break at common point was 6½ feet, and from 7 to 7½ feet at the east heading at Pole Hill.

An average excavation cycle was approximately 3 hours; 3½ hours where the tunnels had to be supported by rings of steel. All in all, 21 per cent of Olympus was supported by bracing, while 29 per cent of Pole Hill Tunnel received that treatment.

On a 3-hour round in rock, however, operations were geared to close limits. It took from 1 hour to 1 hour and 10 minutes to drill out. Then 30 minutes to load and shoot. "Smoke time"—the time necessary for fans to clear the powder smoke away—ranged from 10 to 20 minutes. Mucking averaged an hour. If one operation took a few minutes longer than the schedule, the miners worked like fools to make it up on something else. The miners were on a bonus arrangement and they liked that footage. Just to make sure they didn't like it so well they'd leave too many tight places or overbreak in the bore, the company adjusted the bonus against the miners every time they left bad overbreak or a tight. That was part of the secret of good footage with minimum overbreak.

The hole pattern consisted of a modified pyramid cut, with relievers, arch and rib holes, and lifters all breaking into the burn. Hercules 45 per cent 2X Gelamite was used in the common-point headings, while DuPont 45 per cent Gelex was used at the east Pole Hill heading. Hercules and DuPont electric blasting caps with delays from zero to 10 fired the shots.

When final averages were tabulated, the figures showed that 8 pounds of powder had been used per cubic yard of tunnel excavation. Average drill-bit footage was 275, and it took one pound of drill steel for every cubic yard of rock.

The crew at each heading included, besides the shift boss, 5 miners, 4 chuck tenders, 1 nipper, 3 motormen, 1 brakeman, a mucking-machine operator, 1 electrician, 2 dumpers, and 7 laborers for track, fan-line, and miscellaneous work.

Strangely, there was little ground water. The rock was solid and there were few seepage planes. The tunnels were holed through within the traditional fraction of an inch, and they were then ready for concrete.

Concrete Lining

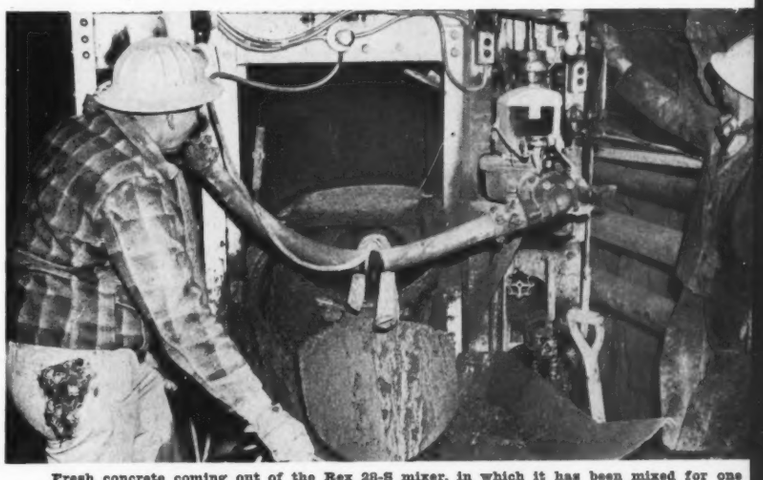
The Bureau of Reclamation is furnishing cement, concrete aggregates, and a few minor tunnel supplies under terms of the contract. It is one of the last carry-over Bureau contracts of that nature, and all new contracts in the vicinity provide for the contractors to furnish almost everything in the way of materials.

The concrete aggregates were produced about 4 years ago. They are delivered by truck to the headquarters site at the common point. Cement, too, is truck-delivered.

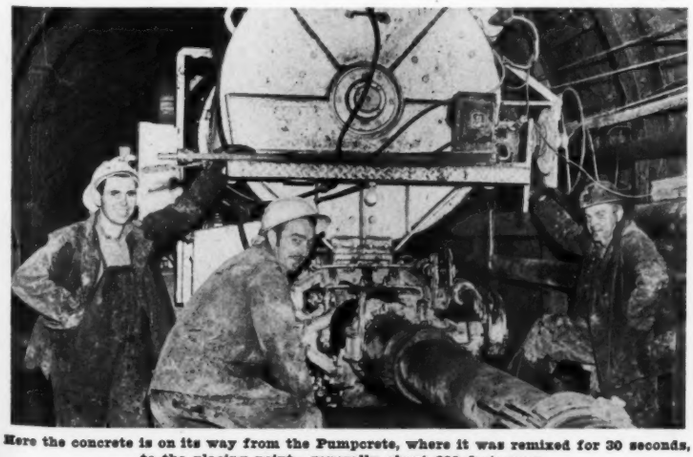
(Continued on next page)

Batching facilities at the common point between headings consist of a Butler 4-bin plant and B-G and Cedarapids conveyors which lift aggregate to the bins.

A rail-mounted rig consisting of conveyors and a Rex mixer (shown here parked outside a tunnel) takes dry-batched material from converted Card cars and turns out concrete.

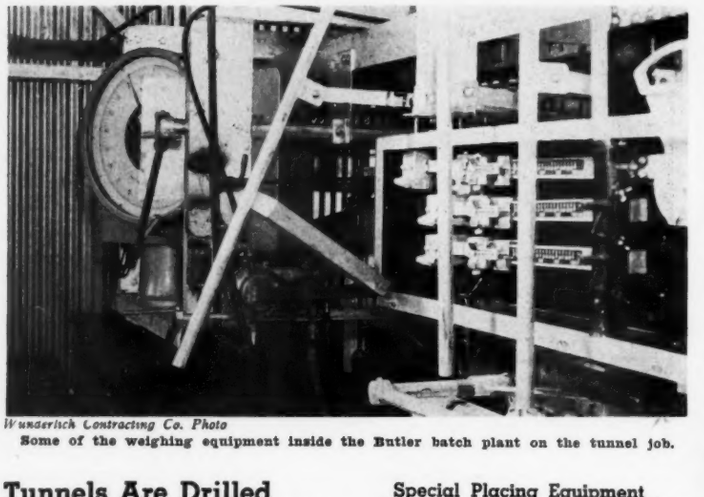


Fresh concrete coming out of the Rex 28-S mixer, in which it has been mixed for one minute, is conveyed to the gob hopper or remix drum of a 200-J Rex Pumpcrete.



Here the concrete is on its way from the Pumpcrete, where it was remixed for 30 seconds, to the placing point—generally about 200 feet away.

The invert is poured first, from the far portal toward the common point. Invert forms were contractor-designed. Arch forms are converted Blaw-Knox.



Wunderlich Contracting Co. Photo

Some of the weighing equipment inside the Butler batch plant on the tunnel job.

Wunderlich Contracting Co. Photo

Arch forms on Wunderlich's tunnel job were converted Blaw-Knox barrel-type assemblies. From the jacking end we see how they were set and collapsed for stripping.

Tunnels Are Drilled Under the Rockies

(Continued from preceding page)

Batching facilities consist of a large Butler 4-bin plant with 76 cubic yards of aggregate capacity and 451 barrels of cement storage. In addition, there is a 1,300-barrel Butler cement silo on the project. Cement scales are the dial recording type, while the aggregate scales are of the beam type.

Two conveyors elevate the aggregates to the batch-bin compartments. One is a 99-foot Barber-Greene 24-inch, while the other is a 101-foot 24-inch Cedarapids. The angle of elevation to the batch plant is 19 degrees. Every day, there passes up this conveyor system some 450,000 pounds of sand, 375,000 pounds of 1½-inch aggregate, and about 400,000 pounds of ¾-inch aggregate. In addition, about 200,000 pounds of cement is used each day.

The same Card mining cars which hauled the tunnel excavation were converted for batch hauling. This was done by putting a different body on the car trucks, equipped with a compartment divider and two sliding bottom gates for dumping. Each car hauls 2 batches, and a trainload consists of 6 to 8 cars.

Each 1-yard batch consists of approximately 1,215 pounds of sand, 1,090 pounds of ¾-inch, 930 pounds of 1½-inch, 509 pounds of cement, and enough Protex air-entraining agent to make from 4 to 5 per cent of entrained air.

Special Placing Equipment

Special equipment was devised to work inside the limited tunnel space.

(Continued on next page)

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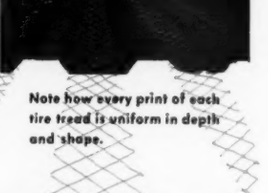
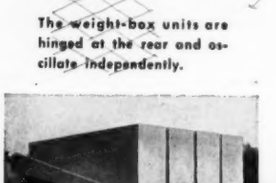
SOUTHWEST
Compaction Roller



Note how every print of each tire tread is uniform in depth and shape.

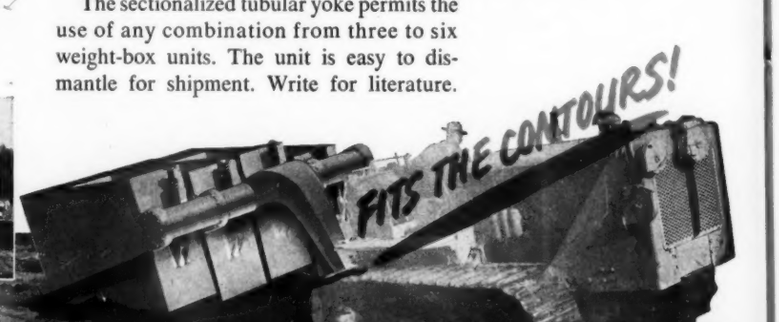
The weight-box units are hinged at the rear and oscillate independently.



For compacting earth fills!

UNEVEN GROUND CONTOURS cannot reduce the efficiency of the new Southwest Compaction Roller. As it travels over the variable surface of the earth fill each weight-box unit with its own wheel and tire oscillates independently up and down. Compaction is positively uniform because the weight on each tire remains constant—there is no bridging and no sudden shifting of load from tire to tire.

The sectionalized tubular yoke permits the use of any combination from three to six weight-box units. The unit is easy to dismantle for shipment. Write for literature.



CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

Alhambra, California

HAULING SCOOPS BULLDOZERS LOADERS BOTTOM DUMP WAGONS RIPPERS TAMPERS SCRAPERS TREE DOZERS

It consists of a series of conveyors and a mixer, which take the dry-batched material from the Card cars and turn it out as freshly mixed concrete.

When the cars come in to this rig, the locomotive rolls two cars at a time up to the dump point. A California switch is used here also to make up the empty train for the return trip to the batch plant. As each car comes up to the dumping point, an operator pulls the slide gates. The dry batches dump to a 30-inch belt conveyor 38 feet 7 inches long, traveling at a speed of 275 fpm. This conveyor dumps the material to a surge hopper.

From the surge hopper, a 24-inch belt 24 feet 3 inches long, traveling at 300 fpm, takes the material to a Rex 28-S concrete mixer, mounted near the center of the rig. Mixed concrete then dumps to a 24-inch, 24-foot, 325-fpm conveyor which takes it up to the gob hopper or remix drum of a 200-J Rex Pumpcrete machine. The special rig consisting of conveyors and mixer is all mounted on rails, and has wheels to permit it to roll forward or backward.

The concrete is remixed 30 seconds in the remix drum of the Pumpcrete machine, and then pumped to the placing point inside the forms. This distance is generally around 200 feet. The concrete is slick-lined into the forms and vibrated externally by Viber PX-6 external-type machines, which, according to General Superintendent Ted Adams, solved one of the most troublesome concrete problems.

The invert is poured first, from the far portal to the end nearest the common point. Then the arch pours are made.

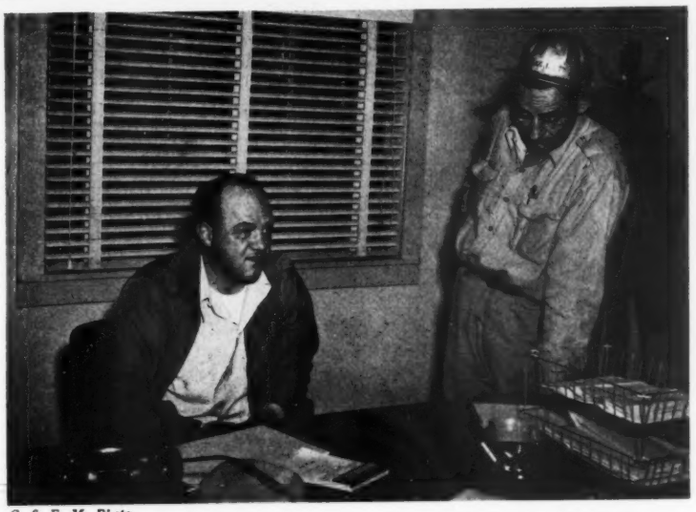
Special Forms

The invert forms were designed by Wunderlich Contracting Co., and made to company specifications in Denver by K. C. Construction Supply Co. They consist basically of a steel diaphragm to form the invert, carried on steel members.

The arch forms are converted Blaw-Knox barrel-type assemblies in 5-foot sections. Five 5-foot sections are joined together to make a 25-foot pour. There are 400 feet of the arch forms available on the job, and 700 linear feet of invert forms. A Noble hydraulic form jumbo is used to carry the arch forms ahead.

One of the unusual features about the concrete lining is that several hundred feet are poured continuously without construction joints. This is done by starting the pour with about 100 feet of forms in place. As the concrete fills up to the toe of the last form, the form gang is there with a collapsed arch-form section. This is set in place, bolted every 5 feet to pins in the invert, and extended to line and grade by the built-in hydraulic jacks on the jumbo. At the end of a day's run, a timber bulkhead is built to make the end of that section.

In order to average 450 feet a day on invert, and 285 feet on arch, the operation had to be extremely well organized. Seconds counted. The Pumpcrete machine was speeded up to 56 cycles per minute. The concrete-mixing time was divided: 1 minute in the mixer and 30 seconds in the remix hopper of the Pumpcrete machine. Crews were organized and each man was assigned to his own particular job.



C. & E. M. Photo

General Superintendent Ted Adams, seated, discusses with Master Mechanic H. D. Wolcott how to make up a grout-pipe connection.

A typical concrete and form crew consists of 4 motormen, 1 brakeman, 1 car dumper, 1 hopperman, 1 mixerman, 1 Pumpcrete operator, 1 oiler, 1 mechanic, 1 electrician, 1 slugger-valve man, 1 nozzleman, 2 vibrator men, 1 form-jumbo operator, 4 cement finishers, 4 form setters, and 4 laborers.

When the forms are stripped and moved ahead, the cement finishers point up any rough spots, and the tunnel is then cured by Techkote pigmented solution.

One of the little tricks, which is saving some money in cleanup costs, is the placing of tar paper on the invert under the railroad track. Dirt, grease, and concrete which fall down from above rest on the paper. When the lining is all placed, men will simply load up the debris, including the tar paper, and wash the lining down with water. That will be that, and the Bureau of Recla-

(Concluded on next page)

DRILLING CONTRACTORS

Diamond and Shot Core Borings
Dry Sample Borings
Grout Holes and Pressure Grouting
Foundation Testing for Bridges, Dams and all Heavy Structures

also

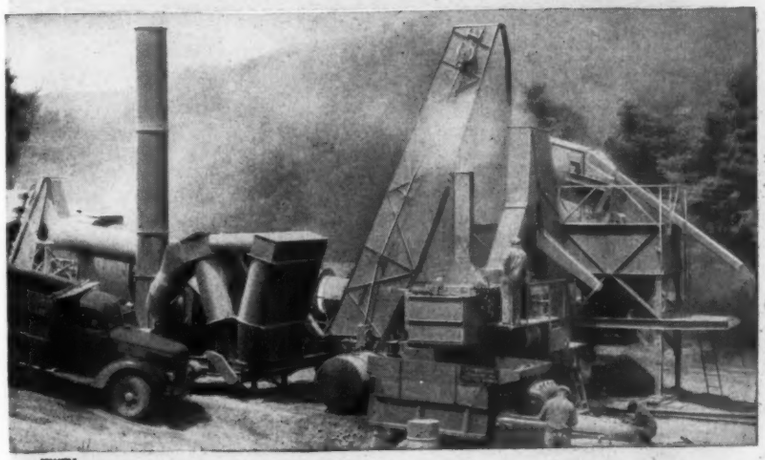
Manufacturers of Diamond and Shot Core Drills, Accessories & Equipment

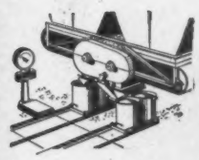
SPRAGUE & HENWOOD, Inc.

Dept. C, Scranton 2, Pa.

Barber-Greene

BITUMINOUS MIXING PLANTS





Mix sampling and calibration facilities provided on B-G High Capacity Plants for mixing highest type 3-and-4 aggregate mixes. Convenient, accurate calibration by weight.

ACCURATE MIX CALIBRATION...BY WEIGHT ON A CONTINUOUS FLOW BASIS CONVENIENT FOR OPERATOR AND INSPECTOR!

Barber-Greene Bituminous Mixing Plants provide many control features not offered in any other type of plant. Here are a few of the provisions that help accomplish these advantages:

AGGREGATE GATES, when set to feed the correct amount of aggregate from each bin, may be locked in position.

OVERFLOW SPOUTS are provided on each aggregate bin for balancing aggregate by rejecting any excess of any size in the bins.

AUTOMATIC CUT-OUT stops plant operation in case of deficiency of any aggregate size.

FINES FEEDER for introducing mineral filler in correct proportion to total mix.

GRADATION UNIT SCREEN and bin design permit separation of aggregate into 2, 3 or 4 fractions to meet *any* specifications.

DUST COLLECTOR for use with any plant when it is necessary to conserve desirable fines in aggregate.

BY-PASS GATE for convenient calibration, inspection and sampling. Aggregate in each bin may be individually sampled without interference to plant operation and production.

BY-PASS GATE ahead of pug mill. Composite aggregate sample may be obtained for convenient testing without interfering with operation and production.

ACCURATE, POSITIVE-DISPLACEMENT bitumen metering pump with interlocked drive to aggregate feeders to guarantee unvarying proportion of bitumen to aggregate.

209-A

BARBER-GREENE COMPANY

AURORA, ILL., U. S. A.

See your B-G Distributor

Tunnels Are Drilled Under the Rockies

(Continued from preceding page)
mation will have another tunnel or two in the Colorado Big Thompson system.

Personnel

Field operations for the USBR are under the direction of Engineers Ken Dickey and Jim Harsh, and Frank Matejka, Construction Engineer—under the supervision of Jim Knights, Manager of the South Platte River District. Avery Batson is the Regional Director at Denver, and the entire project is under the engineering direction of L. N. McClellan, Chief Engineer.

Lake County, Ind., Highway Department used six Swenson material spreaders on a job at Crown Point last summer. Here are two of them.

A New Self-Feeding Materials Spreader

The self-feeding materials spreader introduced by Swenson Spreader & Mfg. Co., Lindenwood, Ill., is designed for use in summer for surface and maintenance work and in winter for snow and ice control.

Clutch-controlled from the truck cab, the Swenson spreader will handle any granular material and will spread both forward and reverse. It comes in various sizes to fit any dump body, and after initial installation requires three pins for attachment or removal.

Accurate spreading is effected through adjustable feed plates which control the amount of material applied. The speed of the truck does not affect the amount of material applied, as the feed roll and rear wheel are synchronized. When the truck stops the flow stops. Various spreading widths may be obtained by blocking off a section of the feed roll.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 709.

New-Type Fork Lift

A new series of gasoline fork trucks specifically designed for operation in and around motor trucks and freight cars is announced by the Philadelphia Division, Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa. Available in capacities up to 2,000 pounds, the Trucker is 68 inches high when the telescopic lift is collapsed. In "duplex" models, the truck can elevate its forks 54 inches before the secondary channels rise to increase the height. This feature allows stacking two-high inside the truck bodies.

All controls in the new Yale fork truck are of the automotive type. Clutch, accelerator, gearshift, and brake are in conventional positions, while controls for hoisting, lowering, and tilting the forks are close to the steering wheel. The hydraulic brakes also follow automotive practice. The power from the engine is transmitted through triple-reduction spur and hypoid gears to the drive axle. The drive axle is enclosed in an oil-tight housing and is the full-floating type with involute spline driveshafts.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 718.

New Underwater Pump

A new underwater pump has been announced by Lancaster Pump & Mfg. Co., Manheim Pike, Lancaster, Pa. The pump and electric motor are designed to operate at depths to 800 feet below the surface. These pumping units come in diameters as small as 4 inches and capacities as large as 2,000 gpm. Motor sizes range from ½ to 250 hp.

The Lancaster underwater pump simplifies water delivery from deep wells, the company says. Other features claimed: it eliminates rods, plungers, cylinders, and there are no long shafts or bearings; it requires no priming and eliminates a pump house; it cannot be damaged by frost, heat, or dust; it is noiseless, easy to install, and requires no attention after installation.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 783.

Lancaster's underwater pump operates at depths to 800 feet below the surface. It comes in capacities ranging up to 2,000 gpm.

in WIRE ROPE, too the RIGHT KIND of muscle makes the difference

Endowed with highly specialized leg muscles, the kangaroo is able to make tremendous flying leaps—even with Junior perched in the rumble seat.

In wire rope, too, specialized jobs call for specialized muscles. That's why in Wickwire Rope we make sure you always get the proper combination of physical properties to best resist the destructive forces found on your particular job—whether it be abrasion, load strain, shock stress or bending fatigue.

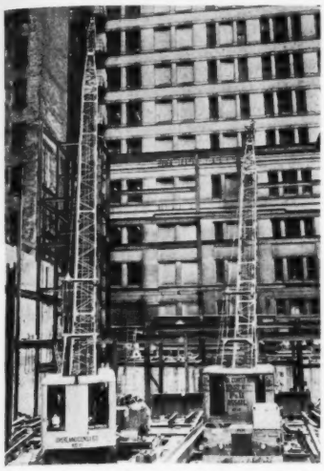
Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

WICKWIRE ROPE
CF&I
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

WICKWIRE ROPE A CF&I PRODUCT
LOOK FOR THE YELLOW TRIANGLE ON THE REEL



It's like erecting steel in a well, handling 15-ton beams for St. Peter's Church in this cramped Chicago Loop area. But the P&H truck cranes are doing all right.

Tight Work Quarters On Steel-Erection Job

A big point of interest to sidewalk superintendents in downtown Chicago is the Franciscan Fathers' new 7-story St. Peter's Church, which nestles between two towering Loop buildings and fronts on busy Madison Street. Wrestling 15-ton beams around in this cramped space is the job of two 20-ton P&H Model 255-A truck cranes. One of these cranes has a boom of 75 feet; the other a boom of 95 feet. Both carry 20-foot jibs, extending their reach to nearly nine stories.

The church will be open for worship or on about December 31, 1951. The general contractor is John Griffiths & Son Construction Co. Overland Construction Co., with Bud Combs as Superintendent, is handling steel erection.

A Laboratory Press For Crushing Tests

A hydraulic press equipped with swivel bearing plates is designed for crushing tests on standard 2 x 2-inch concrete cubes or 2 x 4-inch cylinders. Fred S. Carver Inc., 345 Hudson St., New York 14, N. Y., makes it for standard laboratory tests in highway departments, cement-product plants, and industrial testing labs.

The gage regularly furnished with the press has a working range of 0 to 20,000 pounds of applied load, in divisions of 250 pounds. It is also available with working ranges of 1,000, 2,000, 5,000, and 10,000 pounds, in divisions of 10, 25, 50, and 100 pounds respectively. A special quick-acting coupling on the press makes the gages easy to change. They all have a shock-absorbing slotted link to protect their movement, and the press has a porous stainless-steel pressure snubber for additional protection of the gage tube.

The head of the press carries the swivel bearing plate. A plain bearing plate is on the lower platen. The upper plate swivels on a large hardened-steel ball. Both plates have circular lines on their faces to aid in centering of the specimen accurately. The head of the press may be set at various heights for convenience in operation. The stroke of the ram is sufficient so that tests may be run on cubes or cylinders without change, if desired. The short pump handle provides quick closing against the specimen. The longer extension lever may be slipped onto the handle for a slow application of the load, as required.

Further information may be secured from the company. Or use the Request Card bound in at page 16. Circle No. 745.

This Carver hydraulic press performs laboratory crushing tests on standard 2 x 2-inch concrete cubes or 2 x 4-inch cylinders.

This new 10-ton tandem platform trailer, made by The Trailmobile Co., 31st & Robertson Aves., Oakley, Cincinnati 9, Ohio, has recently completed exhaustive tests to the satisfaction of U. S. Army Engineer Corps inspectors. This special military-type trailer will transport crane-shovel attachments for engineering projects.

Operators Agree...
there's NO WINTER LAYOFF for a
LULL Shoveloader

EXTRA LIFTING STRENGTH
Lull Shoveloaders are equipped with lifting arms of rugged bridge-like construction. They are designed to give maximum lifting strength without bulkiness and to eliminate twisting or swaying even under maximum loads.

SNOW IS NO PROBLEM . . . for a LULL SHOVELOADER

You'll find Shoveloaders working on city streets, at airports, in the country, and around industrial plants, pushing . . . piling . . . plowing . . . or loading snow with their usual cost cutting efficiency.

Lull Shoveloaders are designed with more weight to the rear of tractor for easier handling and greater traction . . . both mighty important factors in winter operation. Power down crowd instantly controlled by operator permits a quick break through of hardest packed, heavy wet or even deep crusted snow. Ideal for clearing the way for heavy traffic or other operations. These are but a few of many reasons more and more experienced operators agree . . . there's NO WINTER LAYOFF for Lull Shoveloaders.

LONG FORWARD REACH permits Lull Shoveloader to fully load truck bodies from the rear, using only one lane of traffic and eliminating extra time consuming maneuvering.

EIGHT VALUE-PACKED MODELS
Eight models with a wide variety of interchangeable attachments make Lull Shoveloaders the most versatile equipment you can own.

Get LULL SHOVELOADER FACTS today.
MAIL THIS COUPON NOW!

LULL Manufacturing Company
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Designers and Builders of
The Largest Line of Allied Equipment
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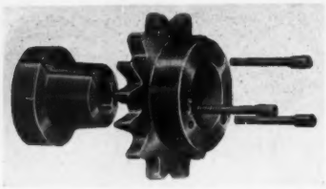
SHOVELOADERS • UNIVERSAL LOADERS • FLUID-DRIVEN SWEEPERS • LULLDOZERS • SHOULDER MAINTAINERS



Interchangeable sprockets are now available for Fort Worth Steel's [QD] V-belt sheave hubs.

New Hub Sprockets Are Interchangeable

Interchangeable sprockets have been announced by Fort Worth Steel & Machinery Co., 3500 Jackson St., Fort Worth, Texas, to fit the company's QD V-belt sheave hubs. They are available in sizes from ½ to 1¾-inch pitch.

The QD sprocket is taper-bored to receive the tapered hub. Bolts are provided to pull the sprocket onto the tapered split hub for a tapered drive assembly and a positive press fit on the shaft. Tapped holes in the sprocket permit the use of pull-up bolts as jack screws to break the tapered fit when dismounting the sprocket. A set screw over the keyway holds the key in position.

The QD sprocket is said to cut the cost of replacement on worn sprockets and reduce the cost of spare sprockets. Reboring on sprockets and V-sheaves is eliminated. The company states that maintenance and break-down time is reduced, as the sprockets can be quickly installed and removed.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 729.

Tractor Gear Group And Fender Improved

Two improvements for Caterpillar tractors have been announced by the Caterpillar Tractor Co., Peoria, Ill. One is the heavy-duty fender, previously offered as an attachment for the D8, as standard equipment on both the D8 and D4. The other is a low-speed gear group for DW10 tractors, designed to improve performance in pusher-loader earth-moving.

The new stronger fenders are manufactured from ½-inch steel plate, and are designed to provide a more rigid platform for mounting equipment, as well as to withstand greater abuse and rough treatment in pioneering and similar work. It is expected that these fenders will also be standard for the D7 and D6 in the near future.

With the new gear group, the first gear speed of DW10 tractors is reduced from 2.8 miles. The second gear speed of the Cat D8 track-type tractor is 2.3 miles an hour, and of D7's, 2.2 miles an hour. These matching operating speeds between pusher tractor and tractor-scraper unit should result in greater loading efficiency, Caterpillar says. The low-speed gear group also provides a greater potential tractive effort for self-loading operations. The remainder of the forward and reverse gears of the low-speed gear group are the same as the standard group.

Data on Storage Bins

Storage and loading bins are described in a new pamphlet released by Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn. It covers sizes, specifications, and applications, together with the types of bin gates available for discharging the bins. Included are single and multiple-compartment bins up to 45-cubic-yard capacity.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 736.

Snyder is B-K President

W. Cordes Snyder, Jr., former Vice President of Koppers Co. and Manager of its Metallurgical Department, is now President of Blaw-Knox Co., Pittsburgh, Pa. He succeeds William P. Witherow, who continues as Chairman.

2 ways to make crane operations pay more

Rud-O-Matic Magnet Reel Tagline Combination

Steel tagline holds magnet steady and absorbs the load . . . protective slack is maintained in expensive magnet cable to avoid jerking, pulling loose at the terminals or snagging.

Standard with major crane manufacturers, made in five sizes for your present equipment.

Rud-O-Matic Tagline

steadies your clamshell buckets. Provides ample coil spring power at all boom angles to keep bucket lined up with the work. Makes more loads per day easier. Rud-O-Matics are foolproof, trouble-free. Eight sizes meet all requirements. Available immediately. *For full information see your dealer—or mail coupon below.*

I'd like more information on ☐ Rud-O-Matic Taglines, ☐ Rud-O-Matic Magnet Reel-Tagline Combinations. Send literature and complete details.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

McCAFFREY-RUDDOCK Tagline CORPORATION

2131 East 25th Street • Los Angeles 58, California

Another job better done with

Settling Tanks, Sewage Disposal Plant, New Haven, Conn.

Air Entraining Agent for all Concrete

City Engineer: W. VINCENT BARRY

Contractor: C. W. BLAKESLEE & SONS, Inc., New Haven

On job after job these facts have been proved: Darex AEA concrete places easier and faster, finishes better, has better surface texture, is more homogeneous, thus more watertight.

At no extra cost, ready-mix concrete plants everywhere can furnish concrete that offers you these same advantages . . . concrete made with Darex AEA. Ask your supplier, or write to us for full details.

CONSTRUCTION SPECIALTIES DIVISION

DEWEY and ALMY Chemical Company

CAMBRIDGE 40, MASS. • CHICAGO 38 • MONTREAL 32

Why Do We Say— "A CUMMER Plant Will Cut Your Costs... Increase Your Profit?"

Because CUMMER Portable Asphalt Plants Produce More—*Faster*—at *Lower Cost!*

The improved, big-capacity *Cummer Dryer* is fast-producing, exceptionally efficient . . . Cummer Portable Plants are easily transportable — can be completely assembled in as little as 12 hours . . . No chain or belt drives — all moving parts are individually motor driven . . . Cummer Plants are complete power units with vibrating screen, mixer, dust elevator, enclosed cold elevator, cold storage bin and feeder . . . Fired with oil or gas burners . . . Can be powered with Diesel engines . . . Available in sizes from 60 to 100 tons per hour . . . Axles and pneumatics may be furnished . . . Cummer Portable Asphalt Plants lead the field for sensible, modern design, rugged construction, low operating costs and continuous, profitable production. With a Cummer you *maximize* output . . . *minimize* overhead! Write for a Cummer Catalog today.

THE F. D. CUMMER & SON COMPANY • CLEVELAND 14, OHIO

BUILDERS OF FINE ASPHALT PLANTS

You can make this Sterling salt spreader in your shop. International Salt Co. supplies the plans.

A New Easy-to-Make Rock-Salt Spreader

A salt spreader which can be made simply and economically in any highway-maintenance garage, from materials that are generally on hand, has been patented by International Salt Co., Inc., Scranton 2, Pa. The company now offers the plans of the spreader to interested highway departments.

The Sterling Rock Salt Shaker hooks over the tailgate of any truck, and can be attached, removed, or changed from one truck to another without alterations, bolts, or other holding devices. The metal trough holds 250 pounds of coarse rock salt. The salt pours onto the highway through adjustable holes in the bottom of the trough. A simple regulating handle controls the rate of flow.

The Shaker is set to the far left of the tailgate so that it overhangs the center of the road and distributes salt equally on both sides of the line. This means that the truck need make only one trip down the highway to cover both sides during an average storm. With the truck rolling along at 15 mph and the Shaker set to one-half the maximum capacity of the openings, the salt goes down at a rate of 300 to 400 pounds per mile of 20-foot pavement. A change in the size of the openings or in the truck speed permits quick adjustment in the amount going down. Once you have the desired application rate, it is unnecessary to use the regulating handle further.

Additional details about the Shaker, including the approximate cost of building it, may be obtained from the company. Or use the Request Card at page 16. Circle No. 780.

New Drawing Table

A four-post drawing table with a sturdy maple frame and a 1⅛-inch nonwarping basswood drawing surface is announced by The Kingsley Mfg. Co., 748 E. 82nd St., Cleveland 3, Ohio. Top sizes range from 36 x 60 inches to 36 x 72 inches for stock models with special sizes available on order.

Working height is a comfortable 37 inches. The hinged top is adjustable to 55 degrees. The rounded hard-maple apron protects large drawings. Drawers, optional with the Kingsley table, include an 11 x 18 x 4-inch tool drawer with lock and keys, and a tracing drawer 26 x 36 x 2 inches, inside dimensions. The table is shipped from the factory in a package of six sections. Only a screw driver and a few minutes are required for assembly.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 779.

Kingsley Mfg. Co. makes this drawing table. Working height is 37 inches.

Tree-Trimming Tools

A complete line of tree-trimming equipment and metal cutting shears is presented in Catalog No. 32 announced by Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich. Virtually every type of tool used in tree trimming is covered. Each of the products is illustrated and fully described. Brief specifications and sizes are included.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 712.

SOLVE YOUR HAULING PROBLEMS WITH
A "TRANSPORT TRAILER"
Capacities through 75 Ton—Semi and Full Trailers

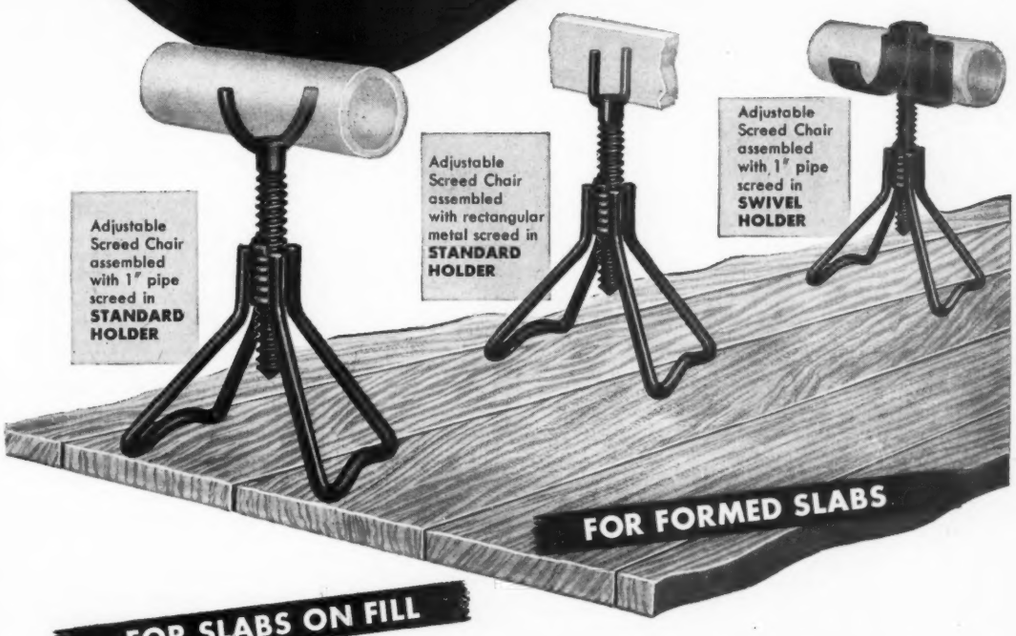
CARGO CARRIER MODEL GPX (Semi) with Tandem Axles

PATENTED TANDEM AXLE ASSEMBLY—Featuring unusual lengthwise and sidewise wheel accommodation to irregularities in the road. Use of full width tubular forged, heat treated axles with CAMBER.

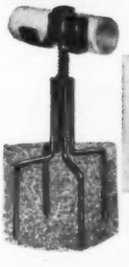
FRAME—Constructed of beam sections throughout, electric welded. A ruggedly strong and efficient unit with minimum weight.

TRANSPORT TRAILERS, INC.
TRANSPORTATION ENGINEERING A SPECIALTY
CEDAR RAPIDS, IOWA, U.S.A.

SUPERIOR
***Adjustable* SCREED CHAIRS**


Adjustable Screed Chair assembled with 1" pipe screed in STANDARD HOLDER
Adjustable Screed Chair assembled with rectangular metal screed in STANDARD HOLDER
Adjustable Screed Chair assembled with 1" pipe screed in SWIVEL HOLDER
FOR FORMED SLABS

FOR SLABS ON FILL



ADJUSTABLE SCREED CHAIR FOR FILL assembled with 1" pipe screed in swivel holder

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Preloading Solves Problem of Bad Soil

Recent construction of the "world's largest" fully automatic bakery and grocery warehouse on the site of an abandoned quarry was made economically possible by preloading the ground fill. Dr. Arthur Casagrande, world-famous soils expert, said it was perhaps the first large-scale application of preloading ever attempted.

"Preloading", he explained, "is simply applying a dead load or surcharge, equal to the weight of the building itself, over the area to be occupied by the building, and permitting the settlements to develop prior to the construction of the building. Then the load is removed and replaced by the building itself."

Centuries ago builders of the massive cathedrals of Europe, lacking theoretical knowledge of soil mechanics, relied on experience and common sense. They hauled the heavy stone to the building site and stockpiled it in the immediate vicinity. Since construction work was very slow, most of the settlement (resulting from the weight of the stone) occurred prior to the actual construction of the building.

At the American Stores Co. site in Philadelphia, Dr. Casagrande supervised the use of 175,000 cubic yards (260,000 tons) of earth for the preloading operation. After grading with 4 feet of fill in accordance with the architect's specifications, an additional sand fill, 6 feet high and 300 x 500 feet in area, was placed at one end of the area to be occupied by the new warehouse. It was allowed to remain in place for approximately two weeks. It then was transferred to a new location, and this operation was repeated until all of the soil under the building had been "prestressed".

The warehouse section of the combined bakery and warehouse is approximately 1,150 feet long and has more than 500,000 square feet of floor space. Fully stocked, it will exert a pressure of 600 to 700 pounds per square foot. When completed, it will rest on the 4 feet of compressed fill without any other supports.

Although the quarry site was the only one large enough for the structure and was ideally located for access to rail and highway transportation, the cost of supporting the proposed structure on piles was prohibitive. Faced with this problem, A. J. Faulhaber, a vice president and Chief Engineer of the American Stores Co., and the architectural engineers Ganteaume and McMullen, of Boston, consulted Dr. Casagrande of Harvard. After extensive studies and tests at the site Dr. Casagrande recommended preloading the supporting soil.

Local soil conditions were fortunately suited to this operation. The site was underlaid by a loose micaceous sand mixed with heterogeneous fill materials, ranging in depth from zero to 40 feet. Below the sand was rock. It was anticipated that settlements of at least 12 inches could occur, that they would probably be abrupt, erratic, and rapid, and that the method of preloading could be used satisfactorily. This was verified by laboratory tests. To determine how long the surcharge load would have to remain in place, and whether or not the foundation soil would rebound seriously after the surcharge was removed, a full-scale load test was made at the actual site.

Settlement observation points were placed just below the surface of the ground, then a test fill approximately 100 feet square and 10 feet high was constructed. Most of the settlement was found to occur within five days after the fill was completed, and the elastic rebound of the foundation soil was negligible when the fill was removed.

Since the settlement occurred rapidly, it was not considered necessary to load the entire site at one time. The area was divided into zones, each zone approximately 300 x 500 feet, roughly one-third of the area of the building. After the area was brought up to grade, each zone was successively preloaded with a minimum of 6 feet of sand, which was allowed to remain in place for at least two weeks. The load then was removed and shifted to the next zone. At the conclusion of the preloading, all surcharge material was used for adjacent parking lots and filling.

Webster for Hyatt Chicago

Frank H. Webster is Assistant Manager, Western Division, Chicago, Ill., announces Hyatt Bearings Division, General Motors Corp., Harrison, N. J. With Hyatt since 1925, Mr. Webster has served as Sales Engineer in the Oakland, Calif., and Chicago branches of the company.

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Steep Slopes Lined On Concrete Channel

Contractor's Ingenuity Solves Ground Problem, Justifies Economic Design of Flood Ditch

• WHEN engineers of the Soil Conservation Service, U. S. Department of Agriculture, planned 1 to 1 sideslopes for the Wilson-East flood-control channel near San Fernando, Calif., they did so to save on right-of-way acquisition, excavation and concrete costs. Funds were none too plentiful, and they had faith that some contractor would have sufficient ingenuity to place the 4-inch concrete lining on the steep slope. Their faith was fully justified. One of the worst problems a small contractor could face was solved after weeks of trial and error.

The first trial resulted in only 30 feet of lining in 4 hours. Then transverse batter boards were laid along the slopes to make screed points, and that boosted production to 270 feet a shift. That scheme was then refined, and a slip form was made that would slide longitudinally. It solved the problem and boosted production to over 100 feet an hour.

Hadley-Cherry Co. of Los Angeles was the contractor, and the job was some 1.4 miles of the Wilson-East flood channel which will carry East Canyon water down to Pacoima Wash below Hansen Dam, and eventually to Tujunga Wash and the Los Angeles River. The $284,773 contract represented a sizable part of this year's construction schedule of the San Fernando office of the Soil Conservation Service, of the U. S. Department of Agriculture.

Channel Design

The channel passes generally down through settled valley terrain. It crosses private lands, passes at one point beneath the Pacific Electric railway tracks, and crosses several streets. Its location therefore made it necessary to carry the water through concrete-lined channel and culvert sections. The channel is of the open type wherever the nature of terrain and considerations of public safety make it practicable. The culvert section is in deep excavation.

Starting at the northerly end, at Rinaldi Boulevard, which is Station 71 +00.37, the channel consists of an open-type concrete-lined ditch with a bottom width of 5 feet 3 inches and sideslopes of 1 to 1. This section extends to San Fernando Mission Boulevard, Station 59+84.97, where transitions and an 11 x 5½-foot reinforced-concrete culvert section carry the channel under the street.

From the end of the previous structure transition to Station 52+23.15, the open channel passes through a rather heavily settled residential district. In this section there are two 12 x 5-foot culverts (a 13-foot pipe under the Pacific Electric tracks, a box section under Maclay Boulevard, and several open lined sections between to connect these structures).

Beginning at Station 53+05.15 at Maclay Street, the water will pass through a long 7 x 10-foot reinforced-concrete culvert to Station 36+65.15. Then to Station 31+61.93 there is an open section with 8-foot bottom width.

(Continued on next page)

Soil Conservation Service Photo

Concrete is poured on the steep sideslopes of Wilson-East flood channel, using a wide rod moving longitudinally to rod the concrete.

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Steep Slopes Lined On Concrete Channel

(Continued from preceding page)

Transitions and a reinforced-concrete culvert under Fox Street carry the stationing to 30+64.77, and from that point to 20+23.86 there is an open lined section with a bottom width of 8 feet. Transitions and another culvert under Chamberlain Street carry the stationing to 19+62.70. From that point all the way to the end of the job at Station 2+30, the channel is open, with a bottom width of 6 feet. Short transitions are used to blend the open channels to the covered sections.

Excavation

Soil studies over the region were necessarily limited because of a lack of funds, but predictions along that line indicated that average excavation conditions would prevail. Orange orchards through the area did well, and the ground surface showed rich, silty loam. But the area nonetheless is in the alluvial fan pattern where material over the ages has eroded from the nearby mountains, and there was at least a reasonable possibility that large gravel, boulders, or even rock might show up.

Several of the 12 bidding contractors showed an excavation price higher than that quoted by the successful low bidder, and only a few were lower.

Hadley-Cherry made subcontracting arrangements for the 80,000-yard excavating job with Scott & Scott Excavating Co. of Los Angeles, which moved in quickly to get ahead of concrete crews. The first dirt-moving consisted of an 11,000-yard debris basin at the channel intake, with about 12,000 yards over the covered sections down to Station 52+44.50.

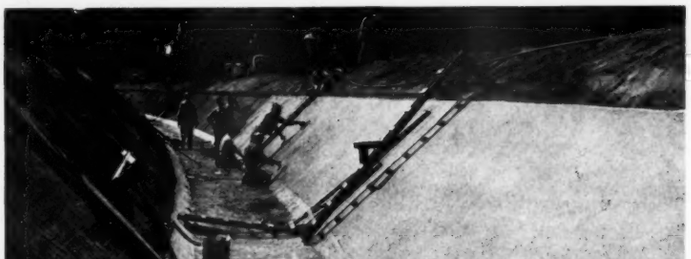
Five Wooldridge Terra Cobras worked at top speed to move that yardage. The earth was good material, and a farmer living nearby wanted every yard. That made only a short haul, under 500 feet. The five Cobras were rolling it out at rates of 6,000 cubic yards per shift, so it was only a matter of a few days until that was done.

But when the excavation reached a point near the lower end of that activity, trouble developed. Boulders and large gravel began to show up. No longer could the Allis-Chalmers HD-19 push tractor boost the Cobras to 20-yard loads. Scott moved a D8 and a K-30 LeTourneau Rooter in to work ahead of the loading units. It helped through the tough places.

The long open-channel stretch at the southerly end of the project involved a 3,500-foot haul to Paxton Playground, a San Fernando civic undertaking near the southeast corner of town. Because of unimproved streets between this playground and the channel, it was possible for the Terra Cobras to haul direct, aided by five 9-yard dump trucks and a Northwest 25 loading dragline.

But the channel bottom width varied from 6 to 8 feet, with some 6-foot ditch, and the Terra Cobras were 10 feet wide. How could a 10-foot scraper handle an 8-foot cut? Scott solved that one by taking enough excess dirt away from one side at the channel top to compensate for the unexcavated material below the point where the channel was 10 feet wide. The Northwest dragline then dug the last 2 feet of ditch excavation and cast it to the nearby area. Actually, the bottom material was much rockier and will make a better service road than the original ground.

As excavation proceeded, it became apparent that concrete crews were headed for trouble. Underlying material was full of gravel and large boulders, and was highly unstable. There were a few cave-ins, and the placement of concrete on such a tricky surface was completely out of the question. General Superintendent Clay Jackson and the SCS Flood Control Engineer Charles W. Thomas held a field conference. It resulted in a solution to the problem: a light flash coat of Gunite.



Soil Conservation Service Photo

The finished surfaces of the channel are smooth and dense, and will carry flows of floodwater with little frictional loss.

Arrangements were then made with Case Gunite Co. of Van Nuys, and as rapidly as excavation could be finished, the Case crews moved in and applied a light Gunite coating, which held the slopes until the concrete lining could be placed. As a rule the Gunite coat was about ¼ inch thick, and went on at the rate of about 150 square yards an hour.

Lining Problem Solved

Unquestionably the worst problem of all was the one connected with concrete lining on 1 to 1 slopes. Many of the contractors who bid the job feared it would have to be a hand-placing operation, because specifications called for a smooth steel-troweled finish and close tolerances.

The invert presented no special problem. The channel bottom was easily fine-graded by hand, and the 90-foot sections were simply placed by transferring truck-mixed concrete by Northwest crane and a 1-yard Gar-Bro bucket to the pour. The concrete was then struck off and finished, carrying the slope concrete about 12 inches up on each side.

(Continued on next page)

Built to dissipate high intensity noise and curb low frequency pressure waves generated by "hot" ram-jet engine tests, this giant acoustical building was an addition to an existing supersonic wind tunnel at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio. The new acoustical house is 50 feet high, 33 feet wide and 190 feet long. Forms for the honeycomb of resonator-type ducts were built by placing ⅝" PlyForm concrete form panels across 2x6 studs, backed by 2x6 wales. After each use, forms were stripped, re-oiled and erected into position for next pour. Contractor was The Hunkin-Conkey Construction Company, Cleveland, Ohio.

Plywood Speeds Formwork By 15 Per Cent...

as giant wind tunnel silencer is rushed to completion

"IT WAS a hurry-up contract with a penalty clause," explains H. F. Hadde, chief engineer for The Hunkin-Conky Construction Company, contractors for the giant reinforced concrete silencer built at Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio.

"Douglas fir plywood concrete form panels, specified for ease of handling and for the smooth concrete surfaces required, helped get the job done fast, too. Plywood speeded formwork application time by 15 per cent."

Here is just one more example of a fact well known to architects, engineers and contractors: easy-to-fabricate Douglas fir plywood concrete forms go up faster, strip easier, last longer—and provide concrete surfaces that are smooth, fin-free and simpler to finish with a minimum of labor.

Douglas Fir Plywood

AMERICA'S

But when the first slope lining was placed, Superintendent Jackson was so dismayed that he shut operations down after only half a shift, and pulled back to recoup his wits. In 4 hours his crew had placed only 30 linear feet of lining. The method was changed, and transverse timber screeds were set up the channel sides. A 10-foot sliding screed was built out of timber and metal to slide over the screed boards. Beginning at the bottom, the crane-dumped concrete was gently carried on up the slope as a hauling line from a tractor pulled the screed up the slope. It was somewhat better, but it gave only 270 feet a shift. At that rate the job couldn't be finished on time at a profit.

So Jackson then got the idea of a traveling slip form which would leave a smooth grade between the concrete invert below and a screed line established at the top of the slope. Why not make the slip form longer, set it at a 30-degree angle behind the straight transverse position, and pull it from the invert?

The same slip form which had been used on the transverse lining was slightly lengthened. Pull hooks were installed near the bottom point, and a small Ferguson rubber-tired tractor was hooked to the drawing ropes. Small ball-bearing casters were installed to roll along the invert concrete and to ride the top-of-slope screed marker. Traveling horizontally along the channel banks, the slip form was successful from the first. After a few shifts the crew became confident, and the transfer crane was discarded. The truck mixers from Arrow Rock Co. began to dump direct.

As the method then worked, the truck mixers hauled a stiff (2-inch slump) 5.8-sack concrete mix to the field. They backed in to the direction of pour, so they could slowly go ahead as the load was dumped. Two men stood on the slip form, on special wooden platforms. As the truck mixer discharged directly through its chute, the concrete went in ahead of the slip form. The two men rodded the concrete vigorously, and struck it off insofar as possible even with the traveling form. The tractor kept the form moving ahead as concrete was placed, and by being careful as the concrete was worked to the finished invert, there was little or no waste of material.

C. & E. M. Photo

Dirt Contractor J. R. Scott, left, talks a tough channel-excavation problem out with Superintendent Clay Jackson, who seems equally perplexed.

Close behind the slip form came a finishing crew, which topped out the lining by applying a ¼ to ½-inch coat of topping mortar with floats and steel trowels. This final operation did a great deal to consolidate the concrete as well. The finished surface is smooth, dense, and will carry flows of floodwater with little frictional loss. The lining and inverts were cured by spraying Hunt Process Clear membrane on the finished concrete.

It is especially noteworthy that the speedup of lining operations was accomplished without increasing the 5-man crew, and by actually decreasing the equipment outlay. Even the Soil Conservation Service engineers admit that the job was better and more workmanlike after the slope problem had been whipped.

So far as structures go, they follow conventional lines. Original plans called for a 13-foot pipe under the Pacific Electric tracks to be jacked under the roadbed, but when the subgrade was found to contain semiconsolidated sand and gravel, Scott knew it would make a rather impossible situation. So Superintendent Jackson, working through his firm of Hadley-Cherry Co., negotiated an agreement with Pacific Electric for the undercrossing to be placed in an open cut. The railway company discontinued service over that branch line for a 5-day period. The open cut was made, the pipe installed, backfill placed, and the railroad rails restored. Then traffic was resumed. It was not necessary to go to the expense of building a shoofly.

The culvert structures were built in sections. First the invert was placed, and then the walls and roof. Reinforcing steel was fairly heavy, and early-strength requirements were so important that high-early-strength cement was used in the 6½-bag structure mix. Concrete cylinders tested in the laboratory showed strengths well above the required 2,500 psi.

Structure forms consisted of plywood facing nailed to 2 x 4 studs, with 2 x 4 wales and steel form bolts on 30-inch centers. The roof-pour supports were prefabbed in the carpenter yard. Rough 4 x 6 railroad-car lagging was used for that purpose. Standard 4 x 6 or 4 x 4 finished lumber is becoming scarcer in southern California, and Hadley-Cherry could buy the lagging for about $30 per 1,000 fbm.

For most of the structure pouring, Viber electric vibrators could be used. The pours were made direct from the truck mixers wherever that was possible. All concrete for the job came from the Roscoe plant of Arrow Rock Co.

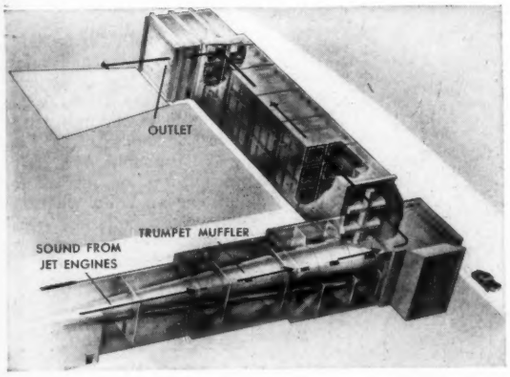
The solution of the lining problem increased the footage to over 800 feet per day's pouring, and that included the hand-cutting and contraction joints every 30 feet, the installation of a fiber expansion joint every 90 feet, and the installation of wire-mesh reinforcement just ahead of the pour. It made possible the completion of the project weeks before the August 29, 1951, scheduled finishing date.

Channel Fills a Gap

The Wilson-East channel, and others like it which the Soil Conservation Service is sponsoring, fills a much needed flood-control gap in the southern-California system. This work is being done under an arrangement where the Soil Conservation Service pays approximately 50 per cent of the cost of the project, with the remaining cost paid by the City of Los Angeles, and the right-of-way being furnished by

(Concluded on next page)

Smooth Plywood-Formed Inner Walls Help Increase Operating Efficiency



Artist's vizualization above shows layout of the complete unit. Sound from engine enters the original trumpet muffler, which screens out most low-frequency waves. A system of concrete baffles and duct mufflers in the new acoustical building stop low and medium frequency vibrations. Here, smooth concrete surfaces were required; roughness would cause a greater pressure drop in air flow and require more power to pass through the ducts. To obtain this required smoothness on the inside—and for attractive exterior appearance, too—the contractor used forms of Douglas fir plywood. Below: construction view of project, showing forms in place.

Large, Light, Strong Real Wood Panels

For additional data on Douglas fir plywood for concrete form work, write (USA only): Douglas Fir Plywood Association, Tacoma 2, Washington. Of particular interest are two booklets: "Concrete Forms of Douglas Fir Plywood" and "Handling PlyForm".

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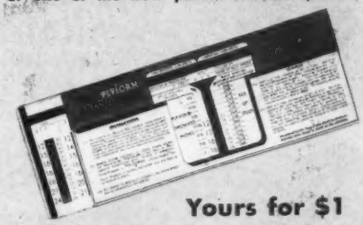

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Steep Slopes Lined On Concrete Channel

(Continued from preceding page)

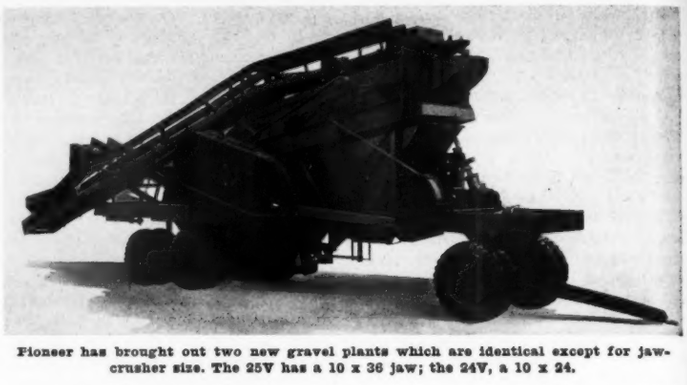
Los Angeles County through its Flood Control District.

Since 1935, the Army Corps of Engineers has been hard at work pushing to completion major dams, reservoirs, and concrete flood-control channels on major streams like the Los Angeles River, Tujunga Wash, Compton Creek, and some of the main tributaries. But water which reached these major floodworks originates high in the San Gabriel Mountains which ring the southland. The SCS work, which is on a smaller scale than Corps of Engineers work, is designed to improve natural watercourses between the mountains and the upper end of Corps of Engineers channels.

Rounding out that program of flood channels is the usual farm-aid program of the Soil Conservation Service. The farmers who live in the San Fernando Valley watershed are being helped to a better utilization of their lands through soil and water conservation practices. The service is cost-free to the farmer (disregarding the fact that most farmers are taxpayers, of course), and he can terminate his agreement in writing at any time. Most San Fernando Valley farmers are so enthusiastic about the small-scale floodworks that many have contributed sums up to $1,000 apiece to help the County finance its share of the work.

The SCS flood-control program is handled in very close liaison with the Corps of Engineers and L. A. County Flood Control District programs . . . and while it is carried on at more of a grass-roots level, it is still a vital part of a highly integrated flood-control plan for what is now the most rapidly expanding industrial and population segment in the country.

Accidents don't happen; they are caused. Remember: safety always pays. And Safety Is No Accident!



Pioneer has brought out two new gravel plants which are identical except for jaw-crusher size. The 25V has a 10 x 36 jaw; the 24V, a 10 x 24.

Two Gravel Plants

Two new gravel plants have been introduced by Pioneer Engineering Works Inc., 1515 Central Ave., Minneapolis 13, Minn. They employ the exclusive Pioneer principle of bottom-deck feed, and are designed to offer a large screening area and to permit balanced crusher loads through adjustment of the jaw-crusher setting.

The two plants are identical except for the size of the jaw crusher. The 25V has a 10 x 36 jaw; the 24V, a 10 x 24. Both models are equipped with a 24 x 16-inch double-roll crusher. The 3 x 10-foot 3½-deck vibrating screen provides 60 square feet of screening area. Both plants are fed with a swivel-type field conveyor equipped with a 24-inch mechanical (reciprocating plate) feeder. Delivery of material is handled by a 24-inch x 25-foot channel-frame conveyor.

Travel height of both plants is 12 feet 6 inches. Over-all length (less feeder conveyor) is 40 feet. Both plants have a 21-foot wheelbase. Travel weight of the 25V, without power unit, is approximately 46,000 pounds; the 24V, approximately 42,100 pounds. The plants are designed for use in areas of restricted highway load limits where, in spite of such weight limitations, reasonably high production of aggregates is required.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 726.

Revolver Cranes on the Job

A 20-page catalog on Revolver cranes for large-scale materials handling has been released by American Hoist & Derrick Co., 63 S. Robert St., St. Paul 1, Minn. It includes data on hook, magnet, and clamshell operations, and on rated lifting capacities of the five standard models. On-the-job illustrations are featured throughout.

This literature may be obtained from the company by requesting Catalog No. 400-R-3. Or use the Request Card at page 16. Circle No. 757.

Lundgren Joins Kuljian Corp.

The Kuljian Corp., international engineering and construction firm, has appointed Robert M. Lundgren Vice President. He will have charge of the company's sales program. Kuljian maintains branch offices in five foreign countries in addition to its offices in Philadelphia and Washington.

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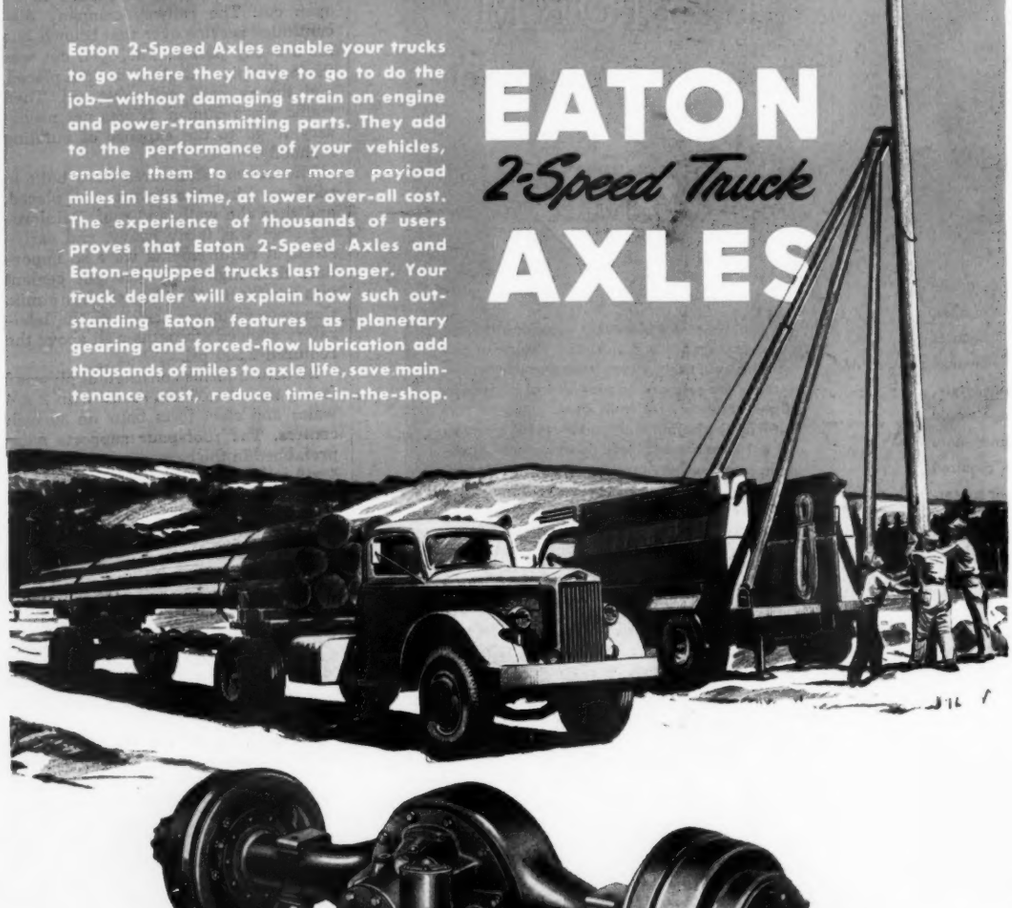
Eaton 2-Speed Axles enable your trucks to go where they have to go to do the job—without damaging strain on engine and power-transmitting parts. They add to the performance of your vehicles, enable them to cover more payload miles in less time, at lower over-all cost. The experience of thousands of users proves that Eaton 2-Speed Axles and Eaton-equipped trucks last longer. Your truck dealer will explain how such outstanding Eaton features as planetary gearing and forced-flow lubrication add thousands of miles to axle life, save maintenance cost, reduce time-in-the-shop.

EATON
2-Speed Truck
AXLES



Axle Division
EATON MANUFACTURING COMPANY
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PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGFITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

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ROSCO MANUFACTURING COMPANY
3124 Snelling Ave. • Minneapolis 6, Minn.

Owatonna's Y-102 pedestal press is designed especially for use with the OTC Power-Twin 17½-ton ram.

New Pedestal Press And Hydraulic Puller

Two new time-saving devices have been announced by Owatonna Tool Co., 381 Cedar St., Owatonna, Minn., for use with its screw-operated pullers. First of these is the OTC Power-Twin hydraulic puller which converts most industrial and diesel screw-operated pullers to hydraulic power. The company states that only a few parts are necessary to speed up tough jobs by at least 50 per cent. The use of the hydraulic conversion set is said to save time and money and avoid damage to expensive parts. The set consists of the Y-17, a 17½-ton-capacity Power-Twin ram and pump assembly, plus adapter parts.

Also announced is the pedestal press for use with this hydraulic puller. The press is portable and compact, and will handle most of the jobs in a garage, implement, or contractor's shop, the company says. It is designed to provide almost unlimited vertical adjustment for pushing or pulling jobs. It may be used for removing or installing pinions, bearings, gears, shafts, and bushings.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 792.

New Truck Engines

A new series of 6-cylinder valve-in-head truck engines has been introduced by Federal Motor Truck Co., Detroit 9, Mich. Power Chief gasoline engines are available in two sizes with 371 or 427-cubic-inch displacement and in 12 models. The smaller engine develops 144 hp, the larger 166 hp, both at 3,000 rpm. They feature a duplex downdraft carburetor, high-velocity governor, climatic manifold control, and a patented system of individual porting.

Improved valving and positive exhaust-valve rotation are claimed for the Power Chief. Valves are stellite-faced and sodium-cooled to reduce corrosion. Other features are full-length water jacketing, directional cooling, chromium-plated top piston rings, alloy-steel crankshaft, Tocco-hardened journals, and oil pump with Float-O-Screen.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 762.

Plant Addition for Republic

A $2,000,000 addition to Republic Rubber Division's plant got under way last summer when O. S. Dollison, Vice President of Lee Rubber & Tire Corp., Youngstown, Ohio, broke the first ground for it. The plant addition will produce wire and textile-braided lead press hose for defense needs. Scheduled for completion in about 10 months, the building will have 80,000 square feet of floor space, will contain the most modern equipment, and will have the capacity to produce many millions of feet of hose yearly.

Center-Lining Equipment

A bulletin on highway center-lining and safety-lane equipment is available from Kelly-Creswell Co., Xenia, Ohio. It covers many machines for highway, municipal, and industrial work, and it highlights the Kelly-Creswell air curtains. These permit straight-edge lines to be applied to any type of surface at any speed; compressed air or exhaust gas is directed against the edges of the spray pattern through specially designed millings in the air curtains. A description and complete specifications are given along with a photograph of each unit. Action shots show the various machines in operation.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 715.

HERE'S A FASTER, EASIER, CHEAPER WAY TO HANDLE MORE DIRT, ROCK OR GRAVEL!

OMAHA STANDARD TRAILERS

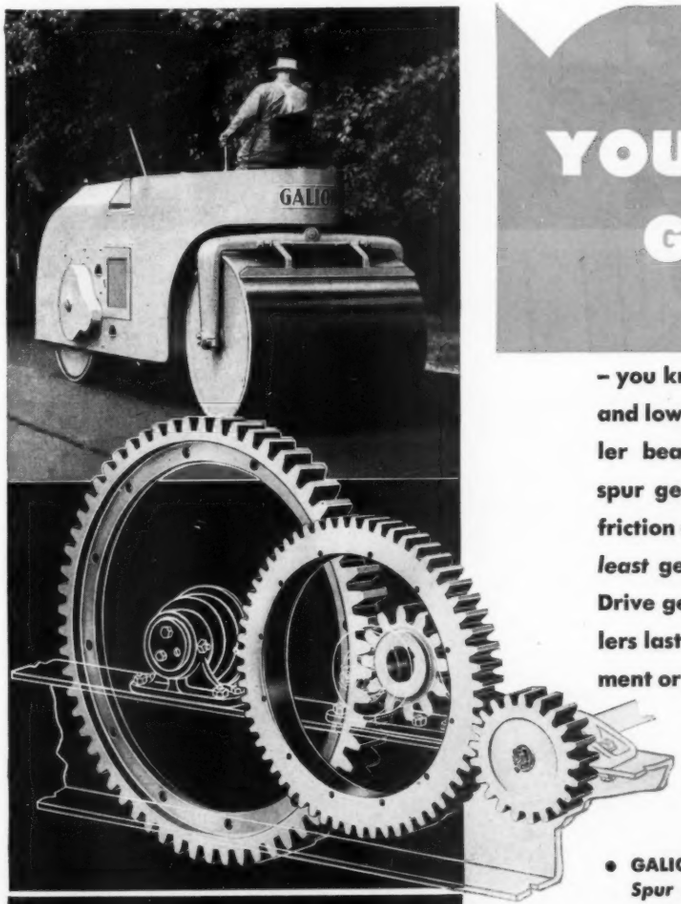
The OMAHA STANDARD "CENTER DUMP" Trailer . . .

. . . Custom Built to Job Requirements is designed for contractors who want to haul dirt, gravel, rock, long or short distances, quickly and at low cost, for stock piling, spreading or dumping. Contractors say it is just what they have been looking for!

★ Each unit built to job requirements.
★ Available in sizes and lengths to meet all bridge and axle laws.
★ All *steel welded* body, chassis. Built to withstand roughest loading, toughest service.
★ Dumping mechanism FOOL-proof—trouble-FREE!
★ Release on doors INSTANT, SHOCK-PROOF, protected from material flow.
★ DOOR OPENING Meter control that can be *pre-set*.

Write at once for specifications and descriptive folder that will answer your questions and show how you can make every load a "profit" load. Address today—

OMAHA STANDARD FACTORY & GENERAL OFFICES 2411 West Broadway Council Bluffs, Iowa



IF YOU KNOW GEARS

– you know that gradual reduction and low speeds (each gear with roller bearings) plus a straight-line spur gear train, develop the *least* friction and consequently cause the *least* gear wear. That is why Final Drive gears on Galion Tandem Rollers last the longest without adjustment or replacement.

REMEMBER! ROLLER RELIABILITY – depends largely on its FINAL DRIVE mechanism

- GALION FINAL DRIVE GEARS are all *Spur Gears.*
- GALION FINAL DRIVE is a *two step* gear reduction train thru four spur gears – a *straight line* drive.
- GALION FINAL DRIVE greatest gear ratio is *only 5 to 1.*
- GALION FINAL DRIVE spur gears are special alloy steel, accurately *machine cut* and heat-treated. No ordinary, uncut, cast gears are used.
- GALION FINAL DRIVE has *no small beveled pinion gear* driving a *large bevel ring gear* on the roll.

Think of these advantages of the Galion Spur Gear Final Drive before you buy a tandem roller.

SPUR GEAR GALION FINAL DRIVE

TANDEM ROLLERS

THE GALION IRON WORKS & MFG. COMPANY

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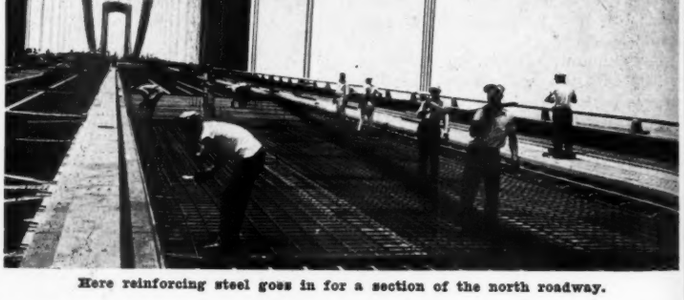
Delaware River Bridge

C. & E. M. Photos

Workmen set forms for a section of the south roadway of the bridge.

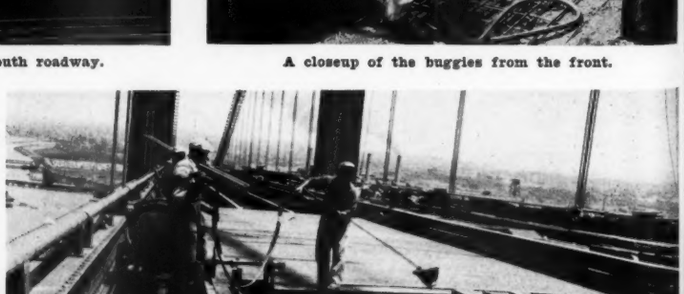


Here reinforcing steel goes in for a section of the north roadway.

Three Whiteman Power Buggies, on a rolling platform, discharge concrete on the south roadway.

A closeup of the buggies from the front.

A Heltzel Flex-Plane screeds the concrete. In the foreground, a Vibro-Plus vibrator.



A workman applies Klearcure compound, using a Thompson spray machine.

Is Paved With Concrete

Power Buggies Transport Concrete Over a Wooden Runway; Two Paving Setups Used in Laying Dual 24-Foot Roadways

By WILLIAM H. QUIRK,
Eastern Editor

• PAVING the Delaware Memorial Bridge to permit its dedication and opening by mid-August was a rush job on a large scale. This new crossing of the Delaware River, 2 miles south of Wilmington, Del., is 2.04 miles long with dual 24-foot reinforced-concrete roadways, 7 inches thick, separated by a 3-foot raised median and flanked on each side by a 3-foot sidewalk.

Paving was done by the Whiting-Turner Contracting Co. of Baltimore, Md., under a $1,043,329 contract to the Delaware Crossing Division of the Delaware State Highway Department, which constructed the $44,000,000 project with the sixth-longest suspension span in the world. The consulting engineering firm of Howard, Needles, Tammen & Bergendoff, of Kansas City and New York, designed the structure and supervised the construction. Merritt-Chapman & Scott Corp. of New York City had the substructure contract for the concrete river piers. Steel for the superstructure was fabricated and erected by the American Bridge Co. (See C. & E. M., Oct., 1950, page 62.)

Steel erection had gotten under way in February, 1950, over the approach land piers at both ends of the bridge. By August 18 of that year the superstructure was far enough advanced to permit the paving contractor to make his first slab pour. The paving was pushed from both ends of the bridge at the same time in order to reach the anchorage piers as soon as possible. This move was necessary to provide access to the anchorages which could not be completed until after the main cables had been connected to the eye bars that are partially embedded in the piers. The anchorage top work was done by Lewis & Bowman, Inc., of Goldsboro, N. C., under a separate contract.

By January of this year, both the Delaware and New Jersey approaches were made available out to the anchorage piers. Then the paving was halted while the steel was being erected for the suspended spans. Whiting-Turner returned to the project the latter part of April and began preparations for paving the suspended spans. The first pour in a main-span slab was made on June 18, and by August 1 the last concrete had been placed in the bridge deck.

Long Bridge

At the bridge site the Delaware is 6,600 feet wide. Total project length with approaches is 4½ miles, connecting Deepwater in New Jersey with Farnhurst in Delaware. Practically all of the river crossing is in Delaware since the state line follows the low-water mark on the New Jersey shore. The New Jersey Turnpike, scheduled for opening this fall, will connect directly with the new bridge, from which traffic southbound will flow over Du-Pont Highway, U. S. 13, through Delaware, or U. S. 40 to Baltimore.

Between abutments the bridge measures 10,765 feet. This total length has three main divisions: 3,087 feet from abutment to anchorage on the New Jersey side; 3,770 feet from abutment to anchorage on the Delaware side; and 3,908 feet of suspended spans and anchorages. The latter dimension is made up of two anchorage piers, each 129 feet long; two end suspended spans at 750 feet; and the 2,150-foot center suspended span. The latter provides for navigation a 175-foot vertical clearance over a 1,500-foot channel. The center line of road at the center of the bridge is 217 feet above mean low water. At the towers, the 19½-inch-diameter cables are 442.2 feet above MLW.

The 3,087 feet of bridge, to the anchorage on the New Jersey side, consists of 5 truss and 13 girder spans. The 3,770 feet of bridge, to the anchorage on the Delaware side, consists of 5 truss and 20 girder spans. Both truss and girder spans are deck-type. Each of the 24-foot roadways is divided into two 12-foot traffic lanes with a 1½-inch center crown. Maximum grade on the bridge is 4 per cent.

Concrete From Both Sides

Each 24-foot roadway was paved full width at a time with 7-inch concrete slabs reinforced both at the top and bottom. Supplied by Bethlehem Steel Co. of Sparrows Point, Md., the steel mats consist of ⅝-inch bars laid transversely across the deck on 7-inch centers both top and bottom, and ½-inch longitudinal bars on 12-inch centers, top and bottom. Bottom bars are hooked, while the top bars are straight. The concrete is 3,000-pound design strength at 28 days. Darex was added to maintain an average air content of 4½ per cent.

In paving the New Jersey side of the bridge out to the anchorage, the contractor got his concrete from Clemente Transit Mix Concrete Co. which has a batching plant 2 miles north of the New Jersey end of the project. After the transit mixers were charged with cement, aggregate, and water, they were

(Continued on next page)

C. & E. M. Photo

J. Leo Hoffman, left, was Superintendent for Whiting-Turner Contracting Co. on the bridge-paving contract. Beside him is the company vice president, Lester N. Phillipy.

LEADERS

...IN CHOICE

HENDRIX DRAGLINE BUCKETS are specified by leading earth-moving contractors . . . operators who want their equipment to take plenty of punishment and produce plenty of profits from the time it goes into operation!

LEADERS

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Operators of draglines get maximum performance with low-cost operation and maintenance, when they use HENDRIX DRAGLINE BUCKETS! Ask the man who uses one . . . he'll tell you!

3/8 TO 40 CUBIC YARDS

★ 20% lighter than other buckets, type for type.
★ All welded construction for greater strength and durability.
★ 14% Manganese Steel Chains, fittings and reversible tooth points.
★ Perfect balance; handles easier, fills faster, dumps cleaner.
★ Full Payload Every Trip; even in wet diggng.

Hendrix Buckets Without Perforations On Special Order Only

HENDRIX Lightweight DRAGLINE BUCKETS

HENDRIX MANUFACTURING CO., INC.

MANSFIELD — LOUISIANA

New Delaware Bridge Paved With Concrete

(Continued from preceding page)

held at the plant for the full mixing period before leaving for the bridge. No extra water was permitted in the tanks of the transit mixers. From 4 to 6 mixers were used, holding from 3½ to 5 cubic yards of concrete.

For the Delaware side and the suspended spans, Warner Central-Mix Concrete was used. The concrete was batched and mixed at a central commercial plant in South Wilmington, and delivered to the bridge after a 3-mile haul in agitator units holding 6 yards. Travel time was about 15 minutes, and one hour was the maximum from the time the concrete was mixed until it was placed in the forms. Up to six truck agitators maintained a steady flow of concrete to the paving contract.

Wooden Forms

Wooden forms were used in pouring the concrete deck. They were supported on the steel floor system, and nailed lightly together for easy stripping. A pair of C. H. & E. table saws were set up on deck to speed the cutting of the lumber. Between the median strip and the curb of each 24-foot roadway are two longitudinal I-beam stringers, 7 feet 8½ inches apart on centers, which divide the roadway into three sections or spans. Across the bottom flanges of these I-beams, 4 x 6's were laid on 4-foot centers. They in turn supported two lines of 4 x 8's, just off the edge of the I-beam stringers.

These longitudinal wooden stringers, averaging 8 feet in length, supported 2 x 6 joists laid across them transversely on 16-inch centers. A single toe nail at each end secured the joist to the 4 x 8 stringers. Over the joists were laid the ⅝-inch plywood panels for the bottom forms. For the 7-foot gap between the edges of the top flanges of the I-beam stringers, there were laid two 3-foot-wide strips of plywood in the center, and a 7-inch strip along each edge to form a haunch. The strip at the edges extended 1 inch beneath the top steel flange. Wedges were driven between the joists and the longitudinal 4 x 8's to bring the plywood panels to exact grade.

In dismantling the forms at the 10 truss and 33 girder spans, a traveling scaffold, 25 feet long x 16 feet wide, was rigged up to move along underneath the steel superstructure. I-beams attached to the top side of the platforms engaged the trolleys which were suspended from the bridge steelwork. The two inner spans or sections were stripped from this scaffold. Forms for the span adjoining the outside stringer were dismantled from a platform that was cantilevered under the bridge from the side. The counterweighted carriage for this rig rode along the deck of the bridge. With this system the forms were quickly stripped after the seventh day following a pour. The traveling scaffold cleared all structural bracing, and did not even have to be removed from the trolleys when a pier was reached.

This arrangement did not work, however, under the suspended spans because of the intricate pattern of steel in the truss floor beams framed between the stiffening trusses. Under this portion of the bridge, six ½-inch cables were strung out under each bay to support a scaffold made from 2 x 12 spruce planks. It was low enough to provide 6-foot clearance for the workers stripping forms.

Buggies Deliver Concrete

In paving the approach spans of the bridge out to the anchorages, the contractor shifted back and forth between the dual roadways as progress of the steelwork required. At the abutment, the truck mixers or agitators unloaded into Whiteman Power Buggies that delivered the concrete to the forms. A wooden runway, over which the buggies operated, was laid out for paving the initial roadway. After the first 24-foot lane was in, the buggies ran over the finished concrete in delivering material for the other half of the bridge. Paving started at the abutment or low end and progressed up the grade to the anchorage piers.

This procedure could not be followed on the suspended spans—the 2,150-foot center span flanked by 750-foot side spans. Because of the unequal weight that would be placed on the suspended steelwork if the paving proceeded continuously from one anchorage to the other, a checkerboard plan of paving was worked out so as to distribute the deck load evenly. The dual roadways were divided by stress joints into 78 blocks, averaging a little over 103 feet in length. Block 1, the first one poured in the suspended span, was on the north roadway of the long center span. Block 2 was immediately west of it on the south roadway. Block 3 was the fourth block to the west on the north roadway, and so on. The pours adjacent to the towers covered two panels in each case, one of which was only about 32 feet long.

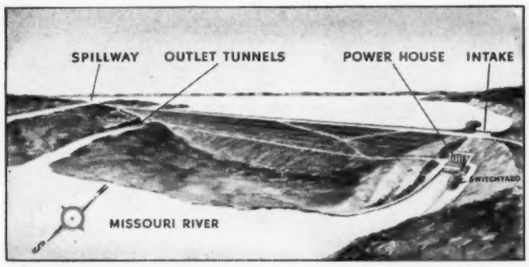
Four complete passes with the paving were necessary, working from the New Jersey to the Delaware side, before the suspended spans were completed. On the first pass only 13 blocks were poured. With the second pass 18 more were added, followed by 26 with the third pass. The remaining 21 blocks were paved in the fourth and final pass. The contractor used two complete finishing outfits, one on each of the 24-foot roadways, so as to eliminate shifting equipment back and forth in following the widely dispersed block sequence of paving.

In order to meet the completion date, Whiting-Turner Contracting Co. set up a construction schedule that called for paving three 103 x 24-foot blocks a day (seven were poured in a maximum day's production). Forms were provided for 4,000 linear feet of 24-foot roadway. On the continuous approach paving, up to 440 feet of one roadway was paved in a day. Production never dropped below 280 feet per day. Work

(Concluded on next page)

Big Red TD 24

BREAKIN' SHALE ON THE BERM. TD-24 pulls a 60,000-lb. capacity spike-tooth roller, evening surface of uncompacted berms. Five TD-24s are literally "all over the place" on this big project's toughest jobs.



ARTIST'S CONCEPTION OF OAHE DAM at completion in 1959. Power works above will provide 420,000 kw with 6 generators, twice as much power as South Dakota produces at present. 78 million cubic yards of earth are involved.

BIG RED REALLY KEEPS THE LOADS MOVING—Whether it's pushing or pulling, TD-24's great power and speed enable it to move more pay dirt faster.

was carried on 7 days a week; 8 hours on Saturdays and Sundays, and 10 hours on the other 5 days.

On Wheels

In paving the suspended spans, the wooden runway for the buggies was laid out along the south side of the structure from anchorage to anchorage. The runway was divided longitudinally into two parts. The inner strip, 3 feet in width, was laid over the 3-foot open-steel-grid refuge sidewalk. The outer strip, 2 feet 2 inches wide, was built in sections 8 to 10 feet long, with posts on the bottom that rested on the deck forms. Thus the two parts were level with each other, and provided a clear runway 5 feet 2 inches wide.

The buggies dumped their concrete from a platform that measured 27 feet wide across the roadway x 12 feet in length. This platform was a sort of rolling bridge that moved on rails. The rails were 4-inch 13-pound H-beams that came in 20-foot lengths, and over half a mile of these sections were on the job. They were laid along the steel curb of the refuge walk on one side, and along the 9-inch curb of the divisor strip on the other. Because of the rivets in the curbs, the beams were laid sideways with their flanges perpendicular to the curb. On the sidewalk side, along the buggy runway, the open slot in the upper half of the beam was filled with strips of 2 x 4's to prevent the buggy wheels from getting hung up. This rail, between the two sections of runway, increased its width to 5½ feet for that part of the runway just ahead of the buggy platform.

As the forms were gradually filled with concrete, the buggy platform or dumping bridge was moved ahead by means of a Beebe 5-ton hoist fastened to the forward end. From the hoist, which was operated by hand, a cable ran out ahead and was fastened to a steel floor member. As the paving advanced, the inner strips of runway supported on posts were picked up as the buggy platform reached them, in order to clear the forms for the concrete. They were laid along the steel railing of the bridge and later moved up ahead.

Concrete Finishing

The I-beam rails along each side were bolted to the curbs, and also carefully shimmed up with steel strips to a precise grade. Over these rails also rode a Heltzel Flex-Plane screed that leveled off the concrete to the exact 7-inch depth. As the buggies dumped the concrete it was vibrated in front of the screed. Both gas-driven Vibro-Plus and Jackson vibrators were used.

On the back of the power screed was a platform for the finishers. This machine was followed by a finishers' bridge. Longitudinal screeding was done by hand between the two units, with one man on the screed platform and the other on the bridge. The surface of the concrete was checked with a Cleveland 10-foot straightedge, and then given a broom finish. From another bridge, a finisher applied Klearcure membrane curing compound with a Thompson spray machine that was rolled along on the sidewalk.

A similar string of equipment operated over the other roadway. When the machines were moved ahead to another block in the checkerboard paving pattern on the suspended spans, 4 x 4's were laid on the curbs for the rollers to run on. But for the actual paving of a block, the steel rails were used.

Long Buggy Haul

A fleet of 14 Whiteman Power Buggies was used in transporting the concrete to the forms from the Delaware anchorage where they were loaded from the agitator trucks. Each buggy held ½ yard of concrete, and was built up with a front lip so as to reduce spillage. The maximum haul was nearly 4,000 feet. On the maximum grade, 4 per cent, the buggies moved along at a rate of 7 to 8 mph with a load of concrete. Otherwise they averaged about 12 mph.

Turnouts for the buggies paralleling the runway were provided at frequent intervals. At first these turnouts were 18 feet long x 4½ feet wide, enough to accommodate two buggies comfortably. With the many units operating, and the long haul involved, it was found necessary to increase the length of the turnouts so that four buggies might turn off at one station to give the loaded machines the right-of-way.

Quantities and Personnel

The deck-paving contract for the 2.04-mile Delaware Memorial Bridge contained three major items:

Concrete	11,500 cu. yds.
Reinforcing steel	1,300 tons
Structural steel	60 tons

The Whiting-Turner Contracting Co. employed a force of between 80 and 100 men on the project under the direction of Lester N. Phillipy, Vice President, and J. Leo Hoffman, Superintendent. Homer R. Seely was Project Engineer for the consultants—Howard, Needles, Tammen & Bergendoff. Col. William A. McWilliams is Director, Delaware Crossing Division, Delaware State Highway Department.

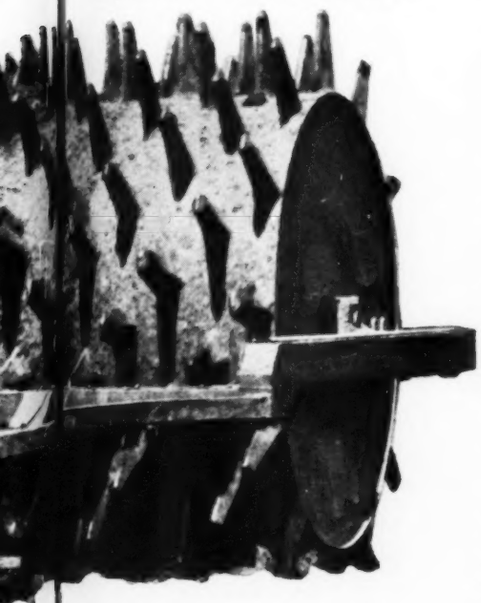
During 1952 the bridge is expected to carry 5,130,000 vehicles. According to present plans the passenger-car toll on the span will be 75 cents, which compares favorably with the 85 cents now being charged on the New Castle-Pennsville Ferry. The State will scrap the ferry after the bridge is opened.

The 2,150-foot main span of the Delaware Memorial Bridge is exceeded in length by only five other structures: the 4,200-foot Golden Gate; 3,500-foot George Washington; 2,800-foot Tacoma; 2,310-foot San Francisco-Oakland Bay; and the 2,300-foot Bronx-Whitestone.

Hercules Promotes Kelleher

J. Joseph Kelleher has been appointed Assistant Director of Sales of the Explosives Department, announces Hercules Powder Co., Wilmington, Del. Mr. Kelleher, formerly Assistant Sales Manager, has held various posts in the Hercules Explosives Department.

Rolls Out the Wrinkles on Oahe Dam



Five International TD-24s star on dam project, harnessing the "Big Muddy," creating a 250-mile lake and irrigating two million South Dakota acres.

Contractor's superintendents, dirt boss and skinners at the big Oahe Dam project on the Missouri River near Pierre, South Dakota—all will bend your ear about "Big Red."

Operator Troy Hood goes on record: "Cutting on a curve, TD-24's Planet Power steering keeps both tracks pulling so you keep all power working to do a faster job."

Here's another TD-24 skinner, Jack Rank: "Son-of-a-gun really has got the power. Much easier to handle than other tractors, easier to work, easier on me. I'm on it 10 hours a day, so I know."

Dirt Foreman Sam Crawford backs them up: "TD-24 can't be beat. We haven't found anyplace it won't go."

John P. Beck, general superintendent for subcontractor Campbell-Collins, has high praise for "Big Red": "We're well satisfied with our TD-24s. Their speed in reverse certainly is an advantage as no time is lost between pushing runs behind our ten scrapers."

There they are—solid reasons for TD-24 preference by the men who move the dirt.

Take their word for it. See your nearest International Industrial Distributor for the facts behind enthusiastic TD-24 performance reports making the rounds. Find out how he backs up the power he sells with full stock of parts, factory-trained mechanics, and the latest service equipment, to keep your equipment in the high output bracket.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

"WE LIKE TD-24 POWER," says John P. Beck of Campbell-Collins (left). Looking on are F. A. Bleecker of Guy H. James Co., prime contractor; L. G. Leavitt, area engineer; and F. P. Evans, office engineer.

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

The Yardlift-150 is a pneumatic-tired fork truck for handling loads up to 15,000 pounds.

A 7½-Ton Fork Truck

The Yardlift-150, a pneumatic-tired fork truck for handling loads up to 15,000 pounds, has been added to the line manufactured by Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich. Maneuverability is achieved by use of a 22-inch-diameter hand wheel which operates a hydraulic-power steering control. When the engine is stopped, the steering linkage can be operated mechanically. The truck is compactly designed for small turning radius, and has a frame of heavy construction.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 767.

Bulletin on Truck Hoist

A new bulletin on the KDLL hoist for long-wheelbase trucks is available from Hercules Steel Products Corp., Galion, Ohio. The hoist is designed for bodies 9 and 10 feet long with capacities up to 3 cubic yards; also for 12 and 14-foot platforms. Specifications and features of the center-lift hoist are included.

This literature may be obtained from the company by requesting Bulletin No. 8051, or by using the Request Card at page 16. Circle No. 742.

Motorola's new Pack Set power supply plugs in to a car or truck firewall (left) so the radiophone can be operated off the vehicle's battery, or it can be mounted on a wall (right) and operated off a 117-volt ac building line. This saves the set's internal batteries for portable operation.

Radiophone Now Uses Three Power Sources

A new Pack Set power supply has been introduced by Motorola, Inc., 4545 W. Augusta Blvd., Chicago 51, Ill., to increase the utility of the FM 2-way radiophone Pack unit. The power supply makes the radiophone convertible to semifixed or mobile uses, conserving the dry-battery supply for portable operation only.

A plug-in power connection and switching facilities on the Pack unit permit quick and easy transfer from internal dry-battery power supply to an external power source. The power supply makes it possible to operate the Pack Set from either a 117-volt ac building line or a 6-volt dc primary power supply such as is found in autos and trucks. It employs rugged all-steel welded construction and is finished in a gray Hammerloid enamel. The complete model includes a bracket to which the power supply is mounted by means of a quick-release cowl fastener. All necessary cables and connectors are included as part of the model.

Further information may be secured from the company. Or Use the Request Card at page 16. Circle No. 764.

Managers for U. S. Plywood

The appointment of Albert H. Frost and Robert J. Linneburg as managers of the Chicago and Detroit branches respectively is announced by United States Plywood Corp., New York.

Both the new managers, who are veteran plywood specialists, have been with U. S. Plywood for a number of years. Mr. Frost joined the firm in 1941 and later became Manager of the Seattle and then of the Detroit branch. Mr. Linneburg, who went to U. S. Plywood in 1934, has been Assistant Manager at Detroit since 1945.

Jerry D. Kayne is now managing the distribution unit of U. S. Plywood Corp. at New Hyde Park, Long Island, N. Y. He used to manage the company's Brooklyn-Queens warehouse.

INGERSOLL SHOVELS

...Edges won't split or curl!

We guarantee this if you make sure to specify . . . INGERSOLL SHOVELS

All Blade Finishes remain Black finish, except Shovels and Spades in Alloy, A and B Grades, which may be furnished with face polished and velvet back, or full polished.

The Special Tillage Steel, known as TEM-CROSS, used in the manufacture of all Ingersoll Shovels, was developed in our own steel mills. By cross-rolling and special heat-treating, we give this steel an interlocking, mesh-grain structure that resists splitting.

Inquiries are invited

INGERSOLL STEEL DIVISION
Borg-Warner Corporation
New Castle, Indiana

INGERSOLL SHOVELS
"A Borg-Warner Product"

ALL-WAYS Practical, Versatile, Economical

"KING" Combination Nipple

Outstanding in its advantages over regular iron pipe nipples for connecting all types of hose. Made of non-porous tubular steel, with clean threads and deep, carefully finished corrugations.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods.

DIXON VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA 22, PA.
BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

Concrete Pipe Machinery Co.

MODEL "T" BELL-UP "McCRACKEN" MACHINE

With 40 cu. ft. mixer and skip-loader to serve machine

FOR MAKING PLAIN AND REINFORCED CONCRETE PIPE
Range of Sizes—4" to 36"—80% of the Market

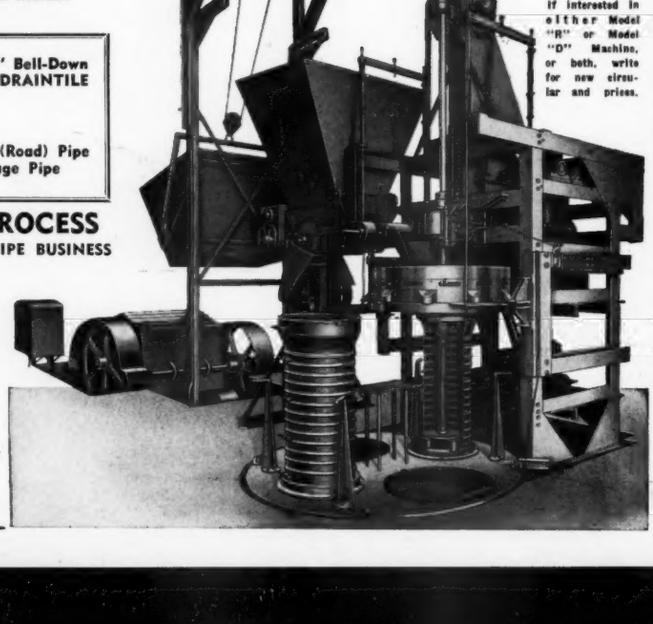
WRITE FOR CATALOG

McCRACKEN PIPE Corrugated

ALSO MAKE MODEL "R"—Sizes 4" to 18" Bell-Down Machine. MODEL "D" Makes Butt-End DRAINTILE in 1 or 2 ft. lengths. Sizes 4" to 16".

USES FOR CONCRETE PIPE

Storm and Sanitary Sewers • Culvert (Road) Pipe
Irrigation (T&G) Pipe • Farm Drainage Pipe



If interested in either Model "R" or Model "D" Machine, or both, write for new circular and prices.

PACKER-ROLLER-HEAD PROCESS

LEADS THE WAY TO MORE PROFITABLE PIPE BUSINESS

Eight-Hour Shifts Produce:

SEWER C-14
Plain B & S Pipe
2400 feet — sizes 4" to 10"
1750 feet — sizes 12" to 18"
1200 feet — sizes 21" to 24"

SEWER C-75 and CULVERT C-76
Reinforced T & G Pipe
1600 feet — sizes 12" to 18"
1100 feet — sizes 21" to 24"
900 feet — sizes 30" to 36"

Concrete Pipe Machinery Co.
Cable Address: Macpipe

EXPORT OFFICE
P. O. Box 252
Pleasantville, N. Y.

MAIN OFFICE
Sioux City (17)
Iowa, U.S.A.

The Thomson F2 flash welder features hand, hydraulic, or Synchro-Matic push-up. It can be used as a production or general-purpose welder.

Production Welders For On-the-Job Use

A complete line of flash and butt welders applicable for production work on construction jobs is manufactured by Thomson Electric Welder Co., 261 Pleasant St., Lynn, Mass. These units are available in four series with a capacity range of 10 to 250 KVA. They feature hand, hydraulic, or Synchro-Matic push-up.

The Synchro-Matic push-up, an exclusive Thomson development, provides automatic, synchronized, streamlined flashing and upset. It is available in three options with regard to clamping and releasing the work and initiating the weld; however, the portion of the welding cycle from flashing to current cutoff is in all cases automatic. Varying skill and judgment are said to be entirely eliminated from the production of high-quality welds.

Detailed data on each of the series may be obtained from the company by indicating the desired capacity range. Or use the Request Card at page 16. Circle No. 706.

Waterproof Covers For Shop Machinery

New plastic, waterproof service covers for the protection of machine tools not in use are offered by South Bend Lathe Works, South Bend 22, Ind. These covers have machine-stitched bound edges for sturdiness and long life. They come in six sizes: 12 x 28 x 28 inches; 21 x 37 x 24 inches; 32 x 48 x 17 inches; 32 x 60 x 17 inches; 38 x 72 x 25 inches; and 38 x 96 x 25 inches.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 758.

Reorganized Sales Policy For Pettibone Mulliken Corp.

The creation of two new posts—a director of sales and an assistant director of sales—inaugurates a major reshaping of the sales policies of most of the companies associated with Pettibone Mulliken Corp., Chicago, Ill.

W. E. Madden, formerly Vice President of George Haiss Mfg. Co., Inc., New York, N. Y., is named Director of Sales; and J. M. Hume, formerly Vice President of Universal Engineering Corp., Cedar Rapids, Iowa, is Assistant Director of Sales. Both will be located at the home office in Chicago, and their duties will be to determine, formulate, and coordinate the sales policies of Pettibone Mulliken Corp.; Hammermills, Inc., Chicago; Universal Engineering Corp.; and George Haiss Mfg. Co.

For Fast, Easy Lettering

"Smart-looking lettering can be done simply and easily", says The Wood-Regan Instrument Co., Inc., Nutley, N. J., in its new bulletin on Wrico lettering guides for maps, drawings, charts, and other graphic material. The bulletin highlights a 3-way scriber which permits simple adjustment for vertical, italic, or slant lettering. It includes actual-size samples of letterings produced with the guides, and lists prices.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 707.

Corps Public Information Office Photo

A Caterpillar grader is refueled in the field during work on Mallonee Village at Fort Bragg, N. C. Loveing-Weaver Co. completed the housing contract last spring. That's a Chevrolet truck carrying the fuel tank.

ROAD BUILDERS — IT'S SENSATIONAL!
DRAGS **PECKERWOOD** DRAGS
STEEL SPRING WIRE ROAD BROOMS
MADE IN ANY C-O-N-T-I-N-U-O-U-S LENGTH UP TO 12 FEET
WIDTH 6 INCHES—IT'S DIFFERENT
ASSEMBLE YOUR OWN—IN ANY SHAPE REQUIRED—IN MINUTES, NOT HOURS
NO FRAME REQUIRED
MADE WITH KILN DRIED 6" WIDE HARDWOOD AND HEAVY SPRING STEEL WIRES TRIPLE OUT EACH HOLE. NOT STAPLE SET
THIS IS IT!

ORDER NOW
ILLUSTRATION OF 10-FOOT LENGTH
ONLY $3.50
RUNNING FOOT F.O.B. K.C., MO.
NOTICE! Our 15" length Unit Drag 3" wide with the two bolts that fits your frame, still $2.50 ea.
SINCE **VAN BRUSH MFG. CO.** 1928
327 SO. WEST BLVD., KANSAS CITY 8, MO.

SPEAKING OF FRONT ENDS...

The Dozer-Shovel gives you a real *Mouthful*

BUCYRUS ERIE

Earth-Moving Champion

The BIG RED TEAM

Get acquainted with a real earth-moving combination — the International TD-24 tractor and Bucyrus-Erie B-type scraper. The Big Red Team is setting new records from coast to coast.

WITH heaping mouthfuls of dirt on pass after pass, the Bucyrus-Erie Dozer-Shovel really puts the bite on your earth-moving costs. And there's no end to the jobs this versatile rig can handle. Available with either dozer blade or bucket front-end, it loads and stockpiles material, grades and levels, builds and maintains roads, excavates backfills, handles clean-up — dozens of digging, loading and lifting jobs.

Top-notch visibility makes it easy for the operator to level off sidewalls, clean out corners . . . swing his rig into the right spots for biggest loads.

Smooth, fast hydraulic control permits raising bucket to top height in 8 seconds — drop it in 4½ seconds — or lower at slow speeds under full control.

Two Dozer-Shovel sizes — ¾-yd. TD-6; 1-yd. TD-9. For complete details on money-saving Dozer-Shovels, see your INTERNATIONAL Industrial Tractor Distributor. 250T51

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

See Your INTERNATIONAL Industrial Tractor Distributor

Reinforced Concrete Frames Bank Building

Vault Walls Are 3 Feet Thick in Federal Reserve Building; H-Beams Encased in RC Columns Give Extra Strength

• THE Jacksonville, Florida, branch of the Federal Reserve Bank of Atlanta will have a new building to take the place of the present quarters on Hogan Street which have long been too small for the volume of business transacted. The modern structure taking shape in downtown Jacksonville, Florida's largest city, is on a plot 209 feet long, north and south, x 141 feet wide, east and west. The 5-story and basement structure, with a 2-story penthouse above the roof, will be 177 x 77 feet, with a reinforced-concrete framework. The front, a long side, faces Julia Street on the west. At the rear, the site adjoins other property to the east. North and south short sides are on Ashley and Church Streets, respectively. A truck entrance into the bank is provided on the Church Street side.

Large old residences were removed from the site to permit the start of construction in October, 1950. The George D. Auchter Co. of Jacksonville is the general contractor, while Henry J. Toombs & Co. of Atlanta, Ga., is the architect. Total cost of the building, scheduled for completion in the spring of 1952, is estimated at $2,500,000. The present bank building has been sold to an insurance company which will take occupancy when Federal Reserve moves to its new location.

A wooden fence was set out from the curb line along Julia Street to give the contractor working room, and to permit trucks to enter and leave the site. Earth Movers, Inc., of Jacksonville, under a subcontract, excavated the foundation to a 20-foot depth below the ground, using a 1-yard dragline, dozer, tractor-loader, and a few trucks to haul away the material. The dirt was spoiled since there was not sufficient room to stockpile for backfill. When the foundation was finished, other material was hauled back in for backfilling around the walls.

Pile Foundation

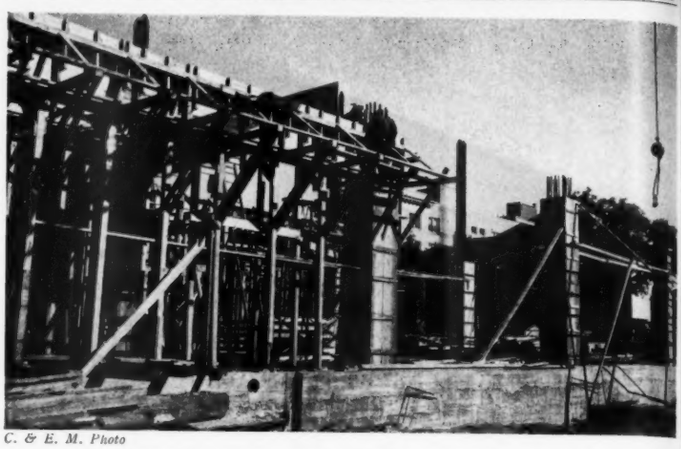
Dirt on the site was mostly red sand, with some scattering of red clay. Water was encountered when the excavation was continued in one location to a 26-foot depth for the elevator shafts and drainage sumps. A Griffin wellpoint system, consisting of no more than 30 points, was installed around this deeper hole to remove the water. It functioned well enough so that water presented no problem over the entire site.

From the bottom of the hole the Raymond Concrete Pile Co. drove 627 piles for the building foundation. The piles are straight taper shells—8 inches at the tip, 14 inches at the butt, and 15 feet in average length—that are filled with concrete. Driving started November 1, 1950, and was completed by December 15. Piles were driven in clusters of 3 to 22 under the main bearing points; they extend at least 3 inches into the concrete footings.

To support the big vault 100 piles were required. This heavily reinforced concrete vault measures 41 x 28 feet on the outside, and extends from the basement to the third floor. Walls, floor, and ceiling are 3 feet thick, with reinforcement on both sides of the 4,000-pound concrete. Floor heights are 14 feet. Concrete footings vary in size and shape, and contain from 3 to 25 yards of concrete. The Ingram Concrete Co. of Jacksonville supplied transit-mix concrete to the job—concrete with a strength of 4,000 pounds per square inch at 28 days for the vault, columns, and framework; and 3,000-pound concrete for the footings, beams, and floor slabs.

Reinforced-Concrete Framework

The building has a heavily reinforced concrete framework. Several of the square or rectangular columns are strengthened further by encasing in them steel H-beams that act as a core. Some of these beams weigh as much as 89 pounds to the foot, and are set within a framework of 1¼-inch-square bars.



C. & E. M. Photo

The concrete framework for the Atlanta Federal Reserve Bank is heavily reinforced. Notice the steel H-beam encased in the column to act as a strengthening core.

Columns may contain from 8 to 20 such bars, and rest on steel base plates anchored in the footings. Some base plates measure as much as 40 x 41 x 5 inches thick, and weigh 1½ tons.

(Continued on next page)

Exhaustive ENGINE TESTS Prove

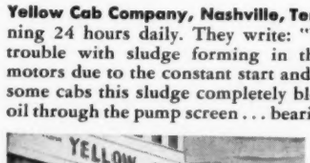
ALL 5 CLRC TESTS, standardized by the Co-ordinating Lubricants Research Committee, prove Shell Rotella Oil superior to the average of leading diesel lubricants . . . from every critical standpoint: parts-wear, corrosion resistance, ring-sticking and piston fouling.

Moreover, further tests, such as the Modified Lauson Lacquer Rating Test and Shell's own extremely severe Four Ball Test . . . all add proof upon proof that Shell Rotella Oil *does* keep engines clean longer . . . *does* extend time between overhauls . . . *does* reduce parts wear.

FLEET SERVICE confirms engine test results!

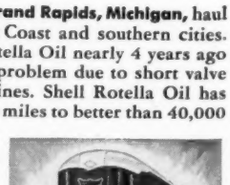
Read these authorized reports:

Yellow Cab Company, Nashville, Tenn., has 75 cabs, running 24 hours daily. They write: "We have always had trouble with sludge forming in the crankcase of our motors due to the constant start and stop driving . . . On some cabs this sludge completely blocked the passage of oil through the pump screen . . . bearings were burned out.



"After months of operation on Shell Rotella Oil we are glad to report that the *motors (thus far) examined have been found entirely clean, the pump screen as bright as brand new, and we have had no bearing trouble of any nature.*"

Creston Transfer Company, Grand Rapids, Michigan, haul uncrated furniture to the East Coast and southern cities. Creston began using Shell Rotella Oil nearly 4 years ago to correct a serious overhaul problem due to short valve life in their trailer truck engines. Shell Rotella Oil has increased valve life from 8,000 miles to better than 40,000 miles and greatly reduced all-around maintenance costs. Creston Transfer is now expanding with hauls to nearly every state. The proved lower maintenance through using Shell Rotella Oil is a basic part of Creston's expansion planning.



SHELL ROTELLA OIL ... EXTENDS

Poured foundation walls, extending up to the first-floor level, are 13 inches thick, while the slab-and-joist floor construction has a total depth of 16½ inches. Along the east side, or rear of the building, the basement extends an additional 21 feet beyond the ground floor. A row of steel sheet piling, 20 feet long, was driven with a Vulcan No. 1 hammer along this east property line to prevent any sloughing during the foundation work. Above this basement extension at the rear of the building is an outdoor parking strip for 21 cars.

On top of the concrete floor slabs goes a 3-inch fill in which service conduits for lights, telephones, etc., are embedded. The fill material is Superock, a lightweight concrete of 800-pound strength. Finished floors vary in material according to location. There are terrazzo and marble flagstones in the main lobby; the large office floors are topped with rubber or asphalt tile; while the private offices will have wall-to-wall carpeting.

Wood and Steel Forms

For exposed faces, the forms were built of ⅝-inch plywood, while the rest of the forms were constructed of 1 to 2-inch stock. Forms for the square or rectangular columns were held in place with steel column clamps. Wall panels were backed with 2 x 4 studs on 12-inch centers and double 2 x 4 wales on centers of 12 to 30 inches depending on the height. For the 3-foot vault walls, double 2 x 6 wales were used with ½-inch threaded rods for ties. Meadows Steel Products furnished the rods and form ties.

For the round columns of 26-inch diameter and over, up to the first floor, steel forms were used. Above the first floor, round columns with diameters from 12 to 24 inches were poured into Sonoco paper tube forms that were peeled off and discarded after being used. Arch metal forms for the joist and floor-slab construction were supplied by Cosco Products Co. of Jacksonville, which also furnished the reinforcing steel. The structural steel, consisting of the H-beams for the columns, came from Aetna Steel Co. of Jacksonville. Conventional wood-joist framing and 4 x 4 jacks supported the metal floor forms. They were easily dropped to the floor below after a pour had been made and the concrete had hardened. A table saw, powered by a Continental Red Seal gas engine, was used to cut form lumber. Erection was done from Safway scaffolding.

C. & E. M. Photo

Form lumber for the new bank building is cut by a table saw powered by a Continental Red Seal gas engine.

The roof is a poured-concrete slab that is covered with a 3-inch insulating course of Foamglas, and topped with a Johns-Manville 5-ply built-up tar and gravel composition. Over that is a 2-inch wearing surface of green concrete to serve as a promenade deck around the penthouse, which will contain both a lounge and a machine room for the elevators. Shuffleboard courts will be laid out on the roof.

Concrete Placing

Although located in a commercial neighborhood, the bank, with its strip of land around the sides of the plot, afforded work space for the construction equipment. In placing concrete, the transit mixers unloaded into 1-yard bottom-dump buckets that were picked up by a Bucyrus-Erie 22-B crane and emptied into a 2-yard hopper. From the hopper the concrete was discharged into rubber-tired Georgia buggies that were wheeled to the forms. Wooden runways were laid out over the metal pans when the deck slabs were poured.

At the start, the crane was equipped with a 60-foot boom, but as the height increased the boom was lengthened to 70 feet and a 12-foot jib was added. In this manner concrete was placed up to the fourth floor. Then a wooden tower was erected to carry a lift and a bucket that dumped automatically into a hopper at floor level for concrete placing above the fourth floor. Concrete was vibrated with a Mall vibrator as it was placed. Water was used in curing.

Exterior curtain walls of the building, enclosing the reinforced-concrete framework of columns and spandrels, are limestone and brick. The limestone is 4 inches thick, and comes in blocks 5 feet wide x 2½ feet high. It is backed with 8-inch common brick giving the wall a 12-inch thickness. The brick is put up first, and the stone tied to it; each block of stone has three anchors holding it to the brick. Ingalls Stone Co. of Bedford, Ind., supplies the limestone.

Exterior and Interior

Around the outside of the building is a base course of granite at ground level, supplied by H. E. Fletcher Co. of West Chelmsford, Mass. The building has windows on three sides; the west, or

(Concluded on next page)

You can EXTEND TIME between overhauls...

SHELL ROTELLA OIL slashes maintenance costs—Maintains engine efficiency

1. Positive ANTI-ACID ACTION

Shell Rotella Oil drastically reduces wear in the vital top-cylinder zone by counteracting the acid action of unburned fuel particles. This protection is extremely important in engines with intermittent loading.

2. Constant DISPERSANT ACTION

The excellent dispersant properties of Shell Rotella Oil permit it to dissolve contaminants and hold them in suspension until draining time. This prevents premature fouling.

3. Maintained Engine Efficiency

Is the direct result of reduced top-cylinder and ring-face wear. Moreover, new or reconditioned engines operating with Shell Rotella Oil show a welcome extension of the "low oil consumption" period because of this same reduced wear. The above gains, combined with freedom from fouling and a significant increase in valve life, enable you to extend time between engine overhauls.

FLEET OPERATORS!

Shell Rotella Oil is "Barrel One" in Shell's famous Three-Barrel Plan for fleet lubrication

If you want to cut lubricant inventories to the bone . . . to realize savings in time, labor and materials . . . mail this coupon for "The Three-Barrel Plan." It's a practical booklet that shows how this revolutionary lubrication program can cut your maintenance costs.

NOW!
THE SHELL 3 BARREL PLAN
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SHELL OIL COMPANY,
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or 100 Bush Street, San Francisco 6, Cal.
Please send me a copy of The Three-Barrel Plan, along with other available information on Shell Rotella Oil.
Name
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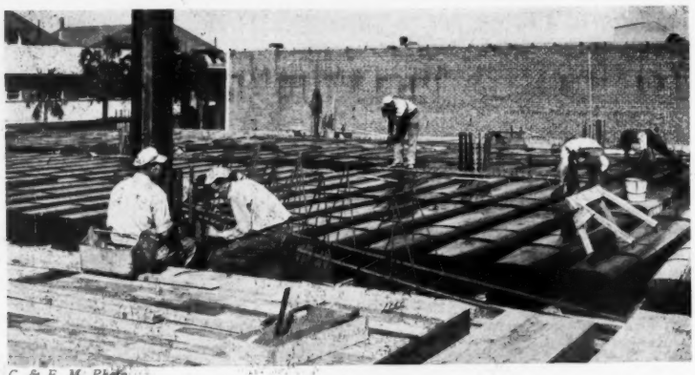
TIME BETWEEN OVERHAULS!



C. & E. M. Photo

Men at work on the Jacksonville, Fla., bank building prepare forms for the next pour. On the left is one of the H-beams to be encased in an RC column.

Bank Building

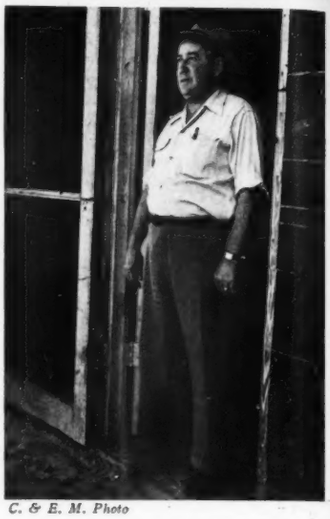
(Continued from preceding page)

front elevation, has none. Windows are aluminum with solar-type shades. The limestone sides extend above the roof to form a parapet with aluminum railing.

The finished basement floor is at elevation 14.33, the first floor is 28.33, and so on to the roof, which is elevation 98.08. The basement contains the boiler room equipped with two fuel-oil boilers for steam heat; the building is completely air-conditioned. Also in the basement is a garage for the bank's trucks, guards' quarters, and the registered-mail room. All public contacts will be made on the main floor, where the board room is also located.

Sorting and shifting of currency will be handled on the second floor. The accounting department will be on the third floor, and general offices on the fourth. Cafeteria, kitchen, and recreation rooms are on the fifth floor. Otis elevators will serve the building—passenger elevators to the right of the main entrance, and freight elevators to the left. The vault doors are Mosler Safe Co. equipment.

In the public rooms the interior finish is chiefly marble. Architectural glazed tile and brick line the walls of the cafeteria, kitchen, and toilets. Private offices have wood-paneled walls, while the rest of the walls are covered with Kalistron, a plastic fabric. Robertson stainless-steel panels are used in the penthouse and for the canopies. Steward-Mellon Co. of Jacksonville is installing the interior tile and marble work.



C. & E. M. Photo

Superintendent S. L. Hodge, snapped on the Federal Reserve Bank project.

Quantities

Major material items in the building include 6,000 cubic yards of concrete; 410 tons of reinforcing steel; 40 tons of structural steel; 2 carloads of marble; and approximately 20 carloads of limestone. Cars hold an average of 40 tons of limestone.

The George D. Auchter Co., general contractor, has a force of 60 men engaged on the construction of the Federal Reserve Bank Building, under the supervision of S. L. Hodge, Superintendent.

Combines Theory, Practice In 4-Year Engineering Course

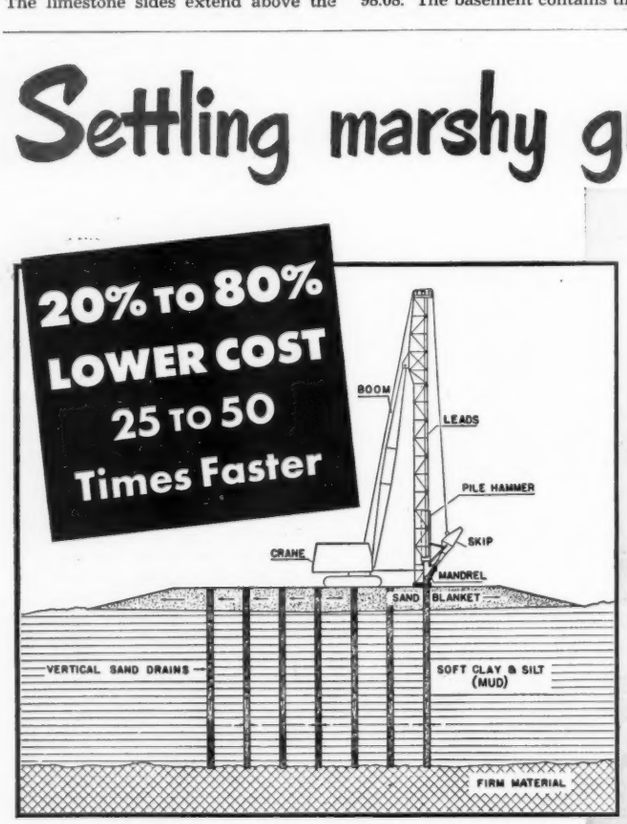
Utica College of Syracuse University, Utica, N. Y., is combining theory with practice in its 4-year engineering course. Major portions of the program include descriptive geometry, analysis of architectural drawings, mechanics for contractors, materials and assembly, the business of contracting, the history and appreciation of architecture, and general courses to support the liberal side of the program.

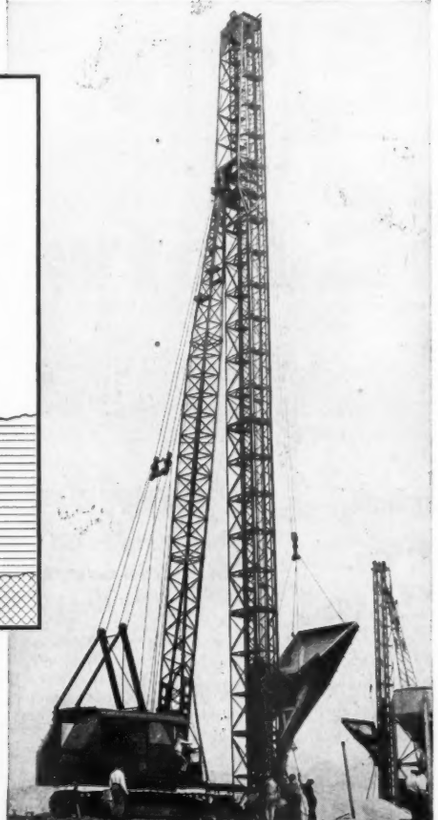
After a student completes the 2-year associate-degree requirements, he may continue his studies, either in day or evening classes, and obtain the baccalaureate degree with two years of advanced credit. The 4-year program requires in-service training during the junior and senior years, either as full-time employment during the summer or part-time work during the school year. Both the course instructors and its backers help the student find such employment.

Frank C. Delle Cese, Treasurer of the Central New York Institute of Architecture, is supervising the course. After its successful trial period last winter, contractors agreed that this emphasis on the practical side of engineering will help circumvent the long and sometimes disappointing apprentice period now necessary for engineering graduates.

Settling marshy ground...

20% TO 80% LOWER COST 25 TO 50 Times Faster





SAND DRAINS . . . the new development for dehydrating marshy ground has provided permanent soil stabilization on important jobs far quicker and at much less cost than any other method.

This method makes use of readily available sand and borrow, and is successful for depths even up to 100 feet and more.

McKiernan-Terry equipment has been used for driving hundreds of thousands of Sand Drains for highways, airports and earth dam foundations. This equipment has been specially designed for the purpose and has been fully proven in service.

McKiernan-Terry Sand Drain equipment is available to contractors all over the country. Write for bulletin describing the operation of this equipment in marsh and swamp reclamation work, and for advice on equipment for your special needs.

McKIERNAN TERRY

SAND DRAINS

Write for Bulletin 61 on Sand Drains

MK 280

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Self-Priming CENTRIFUGAL PUMPS

Engine, belt, and electric driven pumps with many new features to give you outstanding performance at low cost. A.G.C. rated. Write for special bulletins.

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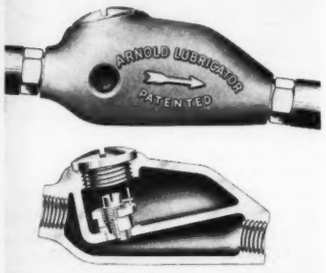

This makes the fourth size of pneumatic-tool lubricator made by the Rucker Co. It is the Arnold No. 2 model—7 inches long, 3½ inches wide and high.

New Air Lubricator

An Arnold lubricator for pneumatic tools is announced by The Rucker Co., 4228 Hollis St., Oakland, Calif. The No. 2 model is 7 inches long, 3½ inches wide and high; it weighs 32 ounces; and it has an oil capacity of ½ pint.

When placed in the air line, this lubricator supplies a flow of "oiled air" to the working parts of the tool. An adjustable feeder enables the operator to adjust the oil flow to the needs of the job. Oil may be added under line pressure. A new pressure-proof window indicates the amount of oil in the lubricator.

Rucker manufactures three other sizes, ranging from 4½ to 10 inches in over-all length and from ⅛ to 1 pint in capacity.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 754.

Koppers Advances Two

The Tar Products Division of Koppers Co., Inc., Pittsburgh, has two new assistant vice presidents—J. C. Macon, Jr., and H. B. Cummings. Mr. Macon retains his former duties as Sales Manager of the Division, and Mr. Cummings his duties as Division Procurement Manager.

The Reese C-125R hydraulic loader is versatile. Here it is shown with a fork-lift attachment for moving loads up to 8,000 pounds, but it comes, too, with a bucket for digging, an angle-dozer blade, or on a jib boom. It is made by Reese Engineering Co., 4441 Santa Fe Ave., Los Angeles 11, Calif. For further information on it, circle No. 793 on the Request Card at page 16.

CLEAVER-BROOKS—DISTRIBUTORS

ALABAMA—J. D. Pittman Tractor Co., 500 N. 28th St., Birmingham 2; Burford-Toothaker Tractor Co., 2521 Halls Mill Rd., Mobile; P. O. Box 1591, Montgomery 2.
ARIZONA—Arizona Cedar Rapids Co., 1726 W. Jackson St., Phoenix.
ARKANSAS—Tri-State Equipment Co., Cantrell Rd. and Booker St., Little Rock.
CALIFORNIA—Cassen Hale Corp., 22101 Meekland Ave., Hayward; Standard Steel Corp., 5001 Boyle Ave., Los Angeles 58.
COLORADO—H. W. Moore Equipment Co., 6th and Acoma Sts., Denver 1.
CONNECTICUT—Deephouse Equipment Co., 160-170 Farmington Ave., Berlin.
D. C., WASHINGTON 2—Hovey-King Co., 314-316 Randolph Pl., N.E.
FLORIDA—Florida-Georgia Tractor Co., Beaver and Huron Sts., Jacksonville; 3139 N. Miami Ave., Miami; P. O. Box 1511, Lakeland; Box 987, New Quincy Highway, Tallahassee; P. O. Box 2248, Tampa.
GEORGIA—W. C. Caye & Co., Inc., 767 Windsor St., S.W., Atlanta.
ILLINOIS—Hilliman Equipment Co., Box 170, Bloomington; 2000 N. Hawthorne, Melrose Park; Wisner, Inc., 821 Main St., Peoria; 1319 Broadway, Rockford, 526 - 11th St., Rock Island.
IDAHO—Intermountain Equipment Co., Broadway at Myrtle St., Boise; 210 N. Fourth, Pocatello.
INDIANA—Reid-Holcomb Co., 1815 Kentucky Ave., Indianapolis.
IOWA—James W. Bell Co., Inc., 1720 1 Ave., N.E., Cedar Rapids; 2816 Fifth Ave., Des Moines 13.
KANSAS—The Victor L. Phillips Co., Box 1557, Wichita.
KENTUCKY—Bogle Equipment Co., 801 E. Third St., Lexington 47; 1212 S. Seventh St., Louisville.
LOUISIANA—Frank P. Fischer Engineering Co., 7924 Maple St., New Orleans 18.
MAINE—Parker-Danner Co., Riverside Drive, Augusta.
MASSACHUSETTS—Parker-Danner Co., 25 Factory St., Hyde Park 36; 71 Needham St., Newton Highlands.
MICHIGAN—Eddy & Co., 1377 E. 8 Mile Rd., Detroit 20; 2500 S. Pennsylvania Ave., Lansing 4; Straits Engineering Co., 400-2 Ashmun St., Sault Ste. Marie.
MINNESOTA—Ruffridge-Johnson Eq. Co., 250 Tenth Ave., S., Minneapolis.
MISSISSIPPI—Watkins-Aldridge Equipment Co., 912-916 S. State St., Jackson.
MISSOURI—The Victor L. Phillips Co., 16th and Baltimore Sts., Kansas City; The George F. Smith Co., 5215 Manchester Ave., St. Louis.
MONTANA—Hall-Perry Machinery Co., 304 Fratt Bldg., Billings; 802-812 E. Iron St., Butte; Coram; P. O. Box 307, Great Falls; Missoula.
NEBRASKA—Anderson Equipment Co., 200 Merchants Nat'l Bank Bldg., Omaha 2.
NEW HAMPSHIRE—Parker-Danner Co., 507 Elm St., Manchester.
NEW JERSEY—R. E. Brooks Co., Route 17, Box 17, Hasbrouck Heights.
NEW MEXICO—R. L. Harrison Co., Inc., 1801 N. Fourth St., Albuquerque.
NEW YORK—Syracuse Supply Co., 76 Wall St., Binghamton; 2060 Military Rd., Buffalo 17; R. E. Brooks Co., 50 Church St., New York; Syracuse Supply Co., Portville Rd., Olean; Van's Equipment Sales, Inc., Routes 9 and 20, Rensselaer; 1348 University Ave., Rochester; Syracuse Supply Co., 294 Ainsley Drive, Syracuse.
NORTH CAROLINA—North Carolina Equipment Co., P. O. Box 5006, Asheville; P. O. Box 1205, Charlotte; P. O. Box 128, Guilford; P. O. Box 655, Wilmington; 3101 Hillsboro St., Raleigh.
NORTH DAKOTA—Northwestern Equipment, Inc., 718 11th St., Bismarck; 901 Eighth St., Devils Lake; P. O. Box 110, Dickinson; P. O. Box 152, Fargo; P. O. Box 335, Minot; P. O. Box 626, Wahpeton.
NEVADA—Sierra Machinery Co., 307 Merrill Ave., Reno.
OHIO—The W. W. Williams Co., 914 Main St., Cincinnati; 18301 Brookpark Rd., Cleveland 11; 435 W. Goodale Blvd., Columbus; 1260 Conant St., Maumee.
OKLAHOMA—The Victor L. Phillips Co., 1101 E. Archer, Tulsa; 1222-24 W. Main St., Oklahoma City.
OREGON—Howard-Cooper Corp., Highway 99E, P. O. Box 433, Albany; Highway 99, P. O. Box 86, Central Point; P. O. Box 1, Coquille; First and Van Buren, Eugene; 5821 N. E. Glisan St., Portland 13; 225 E. 2nd Ave., S., Roseburg.
PENNSYLVANIA—The Capitol Equipment Co., 5100 Paxton St., Harrisburg; Alan A. Wood, 1649 N. Broad St., 905 Hardt Bldg., Philadelphia; Dravo-Doyle Co., 2601 Preble Ave., N.S., Pittsburgh 12.
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SOUTH CAROLINA—South Carolina Equipment Co., 444 Gadsden St., Columbia.
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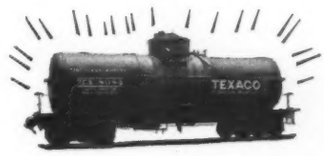
TEXAS—Alamo Iron Works, Brownsville; Corpus Christi; Tri-State Equipment Co., 500 E. Overland St., El Paso; Conley-Lott-Nichols Machinery Co., 1311-19 S. Ervay St., Dallas 1; 3601 Avenue "H," Lubbock; Tri-State Equipment Co., P. O. Box 472, Odessa; Alamo Iron Works, Santa Clara & Montana Sts., San Antonio 6.
UTAH—Kimball Equipment Co., 222 W. 17th St., S., Salt Lake City 10.
VIRGINIA—Hampton Roads Tractor & Equipment Co., W. 39th St. and Killam Ave., Norfolk; Natural Asphalt Corp. of Virginia, 1901 Hamilton St., Richmond.
WASHINGTON—Glenn Carrington & Co., 91 Columbia St., Seattle 4; Howard-Cooper Corp., 5045-55 - 4th Ave., S., Seattle 8; Intermountain Equipment Co., 611 E. Sprague, Spokane.
WEST VIRGINIA—West Virginia Tractor & Eq. Co., P. O. Box 473, Charleston; P. O. Box 587, Clarksburg.
WISCONSIN—The Stone Manufacturing Co., 321 N. 25th St., Milwaukee 3; Badger Equipment Sales, Inc., Route 2, Thiensville.
WYOMING—Studer Tractor & Equipment Co., East Yellowstone Highway, Casper.
ALASKA—Glenn Carrington & Co., c/o Westward Hotel, Anchorage.
CANADA—Mussens Canada, Ltd., Church St., New Brunswick, Fredericton; Coleman Machinery Co., Ltd., 101 Upper Water St., Nova Scotia, Halifax; Mussens Canada, Ltd., 65 Colborne St., Montreal 3; Ontario Equipment & Supply, Ltd., 111 Merton St., Toronto, Ontario; Frost Machinery Co., Ltd., 971 Erin St., Winnepeg, Manitoba; International Agencies & Machinery Co., 2315 Cambie St., Vancouver, B. C.; Mussens Canada, Ltd., Charest Blvd., Quebec.

HOT BITUMEN FROM TANK-CARS

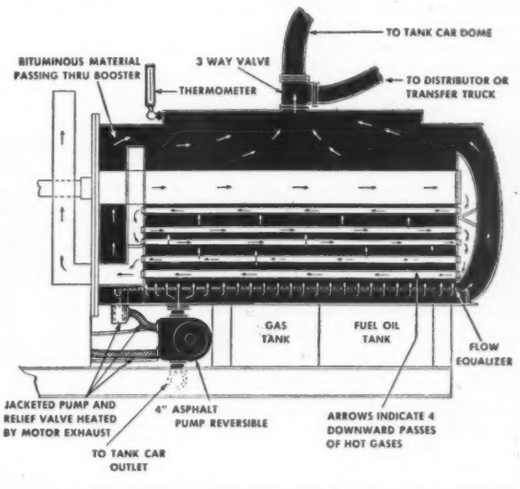
4 times as fast with



a Cleaver-Brooks PORTABLE PUMPING BOOSTER

The inside reason for fast operation:

Cleaver-Brooks Pumping Boosters pump, heat, and circulate bituminous material in one operation. Heating is provided directly, without use of steam, by pumping from tank-car (or storage tank) through the heating element of the Booster and back into tank-car. Entire contents of tank-car need not be heated as in one pass through the Booster, bituminous materials are heated to application temperatures and delivered to distributor, transfer truck, or storage tank; circulation of material while heating prevents separation and assures uniform application. No water or steam required for operation.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BITUMINOUS MATERIAL PASSING THRU BOOSTER
3 WAY VALVE
THERMOMETER
TO DISTRIBUTOR OR TRANSFER TRUCK
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FUEL OIL TANK
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4" ASPHALT PUMP REVERSIBLE
ARROWS INDICATE 4 DOWNWARD PASSES OF HOT GASES
TO TANK CAR OUTLET

Built by the pioneers and originators of pumping boosters:

Cleaver-Brooks Pumping Boosters are available in two sizes (No. 1 heats 10,000 gal. car 35° — 45°F. per hour; No. 2 heats 10,000 gal. car 55° to 65°F., per hour); both sizes obtainable skid-mounted or trailer mounted. Cleaver-Brooks are pioneers and originators of pumping boosters and tank-car heaters — have designed and built this equipment for more than 20 years — many original models are still in action — rendering efficient service.

Get complete information — send for bulletin

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411-K E. Keefe Ave., Milwaukee 12, Wis.

Send for bulletin "Cleaver-Brooks Pumping Boosters" for complete information and specifications

BUILT WITH THE FAMED FOUR-PASS HIGH EFFICIENCY DESIGN OF

Cleaver-Brooks
STEAM BOILERS

Penn Contractors Get Safety Plaques

Two Pennsylvania contractors received permanent plaques last month, commemorating their winning of accident-prevention awards.

Burrell Construction & Supply Co. of New Kensington, winner of the Swenson Trophy, and Harrison Construction Co., Pittsburgh, which won the Zachry Trophy, were the recipients. The plaques are permanent symbols retained by the winners of the trophies, which themselves pass yearly to each successful contestant.

Both the Swenson Trophy and the Zachry Trophy are awarded each year by the Associated General Contractors of America, Inc., to contractors in the United States who have outstanding records in accident prevention.

Highway for Surface Tests: Western States Choose Site

Twelve western states are to share in building a section of bituminous highway which will be subjected to various loads experimentally. (See C. & E. M., Aug., 1951, pg. 29.) The Western Association of State Highway Officials announces that its Standards Committee has approved a southwestern Idaho site for the $300,000 test road section. Between 1½ and 2 miles long, the road will be built 10 miles south of Malad on U. S. 191. Construction, starting this fall, is scheduled for completion by the fall of next year, and the cost will be divided among 12 western states, the U. S. Bureau of Public Roads, the National Academy of Science, and the oil and trucking industries.

Tests, the main object of which is to determine the structural ability of bituminous surfacing to stand up under certain truck axle loadings, will be conducted by the Highway Research Board. They will be similar to the experiments carried out by eastern states in Maryland.

Idaho State Highway Engineer E. V. Miller heads the WASHO Standards Committee: members include W. C. Williams, Assistant Highway Engineer of Oregon; R. H. Kenyon, Washington State Engineer of Highway Plans and Contracts; W. L. Anderson, Assistant Highway Engineer of Utah; and G. R. Egan, Highway Design Engineer of Nevada. The committee met at the request of W. A. Bugge, Director of Washington State Highway and President of WASHO.

Trough Belt Conveyors

A 4-page bulletin featuring a line of trough belt conveyors for handling sand, gravel, and similar abrasive materials is available from Trowbridge Conveyor Co., 850 Van Houten Ave., Clifton, N. J. The line includes portable and stationary units in varying lengths. The portable units are available with belt widths up to 36 inches and in lengths to 60 feet. Each of the units is illustrated. Tables indicate dimensions. General specifications are also included.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 714.

Thurman C. Tejan, Executive Secretary of the Constructors Association of Western Pennsylvania, has two safety-trophy plaques to present. At left, he hands over the Swenson Trophy plaque to Charles H. Booth, Jr., Vice President of Burrell Construction & Supply Co., New Kensington, Pa. Above, Mr. Tejan (extreme right) presents the Zachry Trophy plaque to Max C. Harrison (center), President of Harrison Construction Co., of Pittsburgh, Pa., and E. J. Harrison, Chairman of the Board.

Data on Diesel Engines

Four 2-page folders outlining the operation and construction features of IH heavy-duty engines are available from Industrial Power Division, International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. They offer engineering data on International reserve torque control, all-weather gasoline conversion starting for diesels, combustion control, and long-life lubrication. The folders are illustrated with photographs, drawings, and diagrams.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 790.

Armco Drainage V. P.

L. W. Hanson has been named Vice President of Armco Drainage & Metal Products, Inc., and Manager of the company's Calco Division. He replaces C. R. Hodgkin who has been ill since last fall and prefers to serve the company as a consultant only.

ANNOUNCING

IN FEBRUARY, 1951, two mixes were applied simultaneously to this section of highway. The left side of the road was patched with KOMAC; the right side with another type of patch mix. Both were applied at a temperature of only 25°F. There was no tack coat. No roller was used. The material was compacted under truck wheels only. The three pictures on these pages were taken in April, 1951.

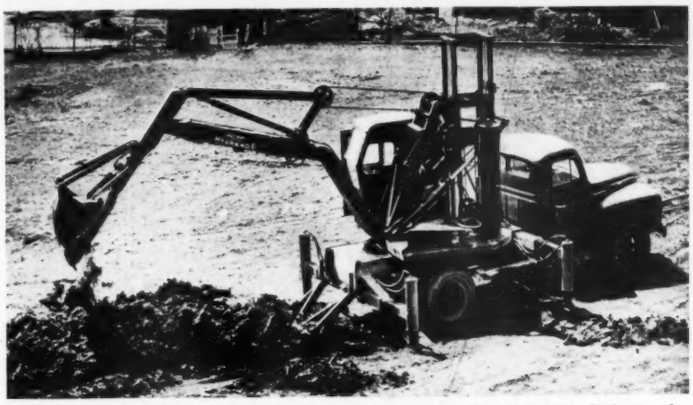
THIS IS THE SAME SECTION of highway, but it is a close-up of the side that did *not* have KOMAC. The regular patch mix started to be displaced immediately. Notice that a good two inches of the patch mix have been thrown out by the traffic.

HERE IS A CLOSE-UP of the KOMAC Premix shown in the above pictures. Notice that there is no sign of wear. It is a pleasure to drive on the tough, skid-resistant surface.

New Hydraulic Hoe For Truck Mounting

A completely hydraulic truck-mounted drag-shovel, the Hydrohoe, is manufactured by Bucyrus-Erie Co., Box 56, South Milwaukee, Wis. It features two separate digging actions; precision control for fraction-of-inch movements; a hydraulic ejector on the dipper; and rapid conversion to clamshell or crane operation in the field.

A hydraulic ram between the boom and the dipper handle provides the force for the machine's primary digging action. Telescoping the boom provides a separate and distinct digging motion. By hydraulically extending and retracting the boom, the Hydrohoe operator can make a level, scallop-free cut, dig across pipe and buried cable, and excavate around boulders to roll them free—all without moving the machine. The manufacturer reports that this telescoping feature saves up to 40 per cent of time usually lost moving up.



Two separate digging actions and a hydraulic ejector on the dipper are features of the Hydrohoe, a completely hydraulic truck-mounted drag-shovel.

The machine is able to travel at speeds of 50 mph on open highways, and may be converted in the field to clamshell or crane service for lifting, setting, and material-handling jobs. The hydraulic ejector built into the dipper pushes the load out with a positive forcing action—"No jerking and jarring to shed sticky material", the company says. The Hydrohoe uses a regular 18-inch bucket or a narrow 12-inch bucket.

All work functions of the machine are fully hydraulic—boom hoist, swing, dipper dig and dump, boom telescope, outrigger set and retract, and positive dirt ejector. The Hydrohoe is reported to work effectively to a 12-foot 6-inch depth over the rear of a truck, and it has a maximum reach of 23 feet. It is operated by the regular truck engine, furnishing power to hydraulic pumps through a power takeoff.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 716.

A New Book Devoted To Soil-Test Methods

Though written primarily as a textbook for teaching soil-testing methods and laboratory practice, "Soil Testing for Engineers" is a valuable reference handbook for practicing engineers and soils-lab personnel. Author T. William Lambe, a member of the staff of M. I. T., covers general laboratory procedures in an introductory chapter, and then devotes one chapter to each of the standard tests.

The chapters are carefully organized and provide subsections on apparatus and supplies, recommended procedures, calculations, results, and numerical examples for each of the tests. The introduction to each chapter defines and discusses the property which is sought in the test, and its practical application. The subsection "Apparatus and Supplies" lists and pictures the necessary equipment. Though detailed procedures are given for each test, the author wisely suggests that these be modified on occasion to meet individual soil conditions. The principles are described in such a way that the experienced instructor or lab technician can see where he may alter procedure to fit a particular need.

The numerical examples given for each test conveniently illustrate the computations involved. These examples employ recommended data-calculation sheets which minimize computation time and mistakes. In an attempt to make the book reasonably self-sufficient, the author has included in the appendix brief derivations of the formulas used in test computations. The Appendix also explains calibration procedure and special techniques.

"Soil Testing for Engineers" is published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. The 165-page book is in loose-leaf form, is easy to read, and is fully illustrated. Price $5.00.

Nold Chairmans Board For Rivers and Harbors

Major General George J. Nold, Deputy Chief of Engineers, has a new duty. He is now Chairman of the Board of Engineers for Rivers and Harbors, succeeding Major General John S. Bragdon, retired. The board is a permanent one required by law to review all reports to Congress on river and harbor, flood-control, and multiple-purpose projects of the Corps of Engineers.

Rubber-Lined Pipe Joints

A new catalog and engineering manual on the Gaco rubber-lined pipe-joint system is available from Gates Engineering Co., Box 1711, Wilmington, Del. It explains how the system reduces the cost and time of pre-engineering and prefabricating sections of rubber-lined pipe; and how Gaco joints may be installed in the field. It lists fittings and specifications of rubber-lined-pipe stockpiles—also the corrosive agents to which Gaco gaskets and linings are resistant.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 791.

a new patching and paving premix

Komac

apply in any weather . . . directly from stockpile

use standard road repair equipment . . .
no heating required

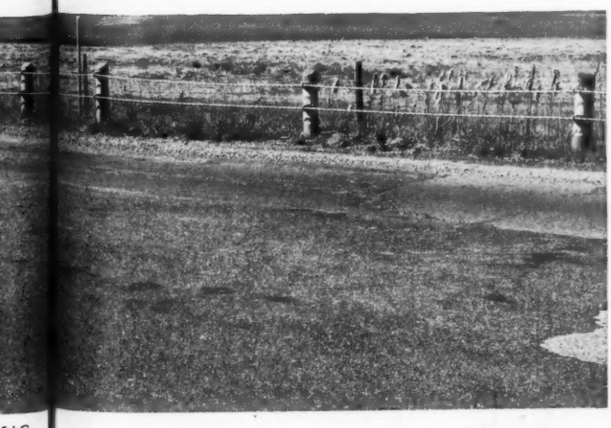
NOW, for the first time, you can patch your roads or resurface an emergency road in the dead of winter. You can fill a chuck-hole or rut in freezing cold. You can maintain a continuous patching program the whole year round, and quiet the motorists who cry out against bad roads during winter.

KOMAC Binders, which are offered exclusively by Koppers, can be mixed with local aggregate—wet or dry, dusty or clean. The KOMAC Premix can be stockpiled for a year or more and will remain easily workable. When needed, it can be shoveled into trucks. It will not stick to tools or truck beds or spreading equipment, etc. Since it contains no volatile solvents, there is no fire hazard.

When using KOMAC for patching, the hole doesn't even have to be bone dry. Just sweep out the water, apply KOMAC mix, sprinkle some sand on the patch and compact it. The road is now open for heavy-duty continuous traffic, both winter *and* summer.

If you mix your own road materials, remember that KOMAC is a cold mix. No heating is required. You simply dump the aggregate into a mixer and add KOMAC Binders according to instructions. KOMAC can be easily and quickly mixed in any kind of mixer. KOMAC Premix can be stockpiled during the summer for use in the winter months.

We'll be glad to give you more information on KOMAC Premix so that you can set up a real all-weather repair and construction program. Write today for our free booklet. Address: Koppers Company, Inc., Tar Products Division, Dept. 1056-R, Pittsburgh 19, Pa.



KOPPERS COMPANY, INC.
TAR PRODUCTS DIVISION, DEPT. 1056-R, PITTSBURGH 19, PA.
District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Alabama

KOPPERS

Komac Premix

Portrait in Print

By RAY DAY

Baldock: Pioneer in Western Roads

C. & E. M. Photo

R. H. Baldock, Oregon's State Highway Engineer, in his office at Salem.

• LATE this month, when the American Association of State Highway Officials meets for its annual convention, a private automobile with an Oregon license plate will roll into Omaha dependably early. Sitting behind the wheel will be a graying, alert man of 60. He'll be making the trip by private automobile because he'll not break his own rule and use a state car when his wife is along. When he arrives in Omaha, he will know engineering details of some of the highways he drove over which even the maintenance engineers in those states might not know.

For this man, a recognized leader in national road building in the old tradition, is all business. Several years ago, while playing golf, Oregon's State Highway Engineer R. H. Baldock found himself in a game with the Rev. George Swift, Salem's Episcopal rector and definitely not a profane man. An interesting situation existed, and Baldock's close friends immediately began to wonder. Up to that time, Baldock had occasionally been known to use a few choice expletives dating back to his early days as a field engineer. What would happen now? Could Baldock influence the minister's language?

He stopped swearing himself.

Far from indicating any lack of force in his character, that example shows what Baldock does with any situation. As always, Baldock simply analyzed this one thoroughly. The minister played a good game. He had a sense of humor, and the kind of broad intellect Baldock likes. It was worthwhile to stop, and have Rev. Swift for a friend.

There are many chief engineers of highway departments today who run their businesses by delegating most of the work to department heads, and then letting it go at that. Baldock has department heads, and they are all excellent men, but he could no more divorce himself from the many interesting problems than he could swear before Rev. George Swift. Baldock is one of the last old-time road-building pioneers, and in spite of the fact that he is currently holding down one of the biggest jobs in Highways, USA, he shows many of the characteristics of the old-time hard-working engineer.

By means of his photographic memory he keeps detail after detail at his fingertips and knows many of his 3,000 employees by name. The designs for a dozen different jobs are in his head. He knows without referring to a push button the cost-benefit ratio for the new Columbia River Highway. He can tell you the strong points of a maintenance supervisor at Roseburg, or go into a learned discussion about new specifications for asphalt.

Sitting in his unpretentious office in the new Highway Building in Salem, Baldock looks and acts exactly like any modern businessman. But back of any decision he makes in 1951 lies a 35-year history of road pioneering by the Oregon State Highway Department. Much of that series of "firsts" was at Baldock's instigation.

For example, the whole theory of permanent alignment began, so far as Baldock can remember, with a job between Swenson and Astoria back in 1927. The old road had 56 degrees of curvature. In an effort to straighten it out and make it safer, engineers ran a new alignment which reduced the curvature to 18 degrees.

Theoretically, that should have solved the problem. But Baldock has a penetrating kind of mind which ignores labels and theories, and searches for fact. He noticed that the average speed of vehicles on this road was not increased appreciably.

The reader-student side of Baldock's makeup is responsible for the introduction of better geometric design for highways in Oregon. Royal Dawson, an engineer with the Egyptian Railway, had written a book on the subject which Baldock happened to read. He saw no

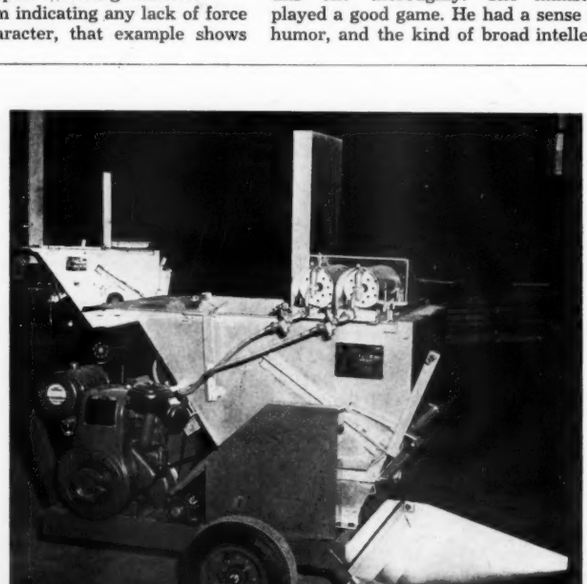
(Continued on next page)

Year-around All-Weather Patching Now Possible with McCONNAUGHAY

HOT UP TO 300°F OR COLD

"MULTI-PUG"

ASPHALT MIXER



Two views—Rebuilding complete section of State Highway #28

The Patching Mixer for Summer or Winter

Patching City Streets.

Building private Driveway

The best way to keep repair costs down is to repair the breaks when they first appear.

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reason why this railroad theory couldn't be applied to highways with better results than he was then getting. Out of this reading and other observations grew a theory in his mind: that *speed* is the criterion of design, and all other factors must be adjusted to fit. Watching driver habits, Baldock also concluded that average human reactions limit ultimate average speed. In other words, a fast-racing driver might be able to make 100 mph on an average highway, but the average automobile driver simply can't attempt that speed. That early theory has been tested and tried for over 20 years, and today Oregon's highways are designed for 70 mph in flat country, 60 mph in rolling terrain, and 50 mph through the mountains.

Oregon was the first state to have a gas tax, beginning with the year 1919. The whole subject of highway taxation is one which Baldock has helped to develop. He is an expert on the matter, as we shall see later—so much so that heavily populated states like New York and Ohio have sent delegations out to Oregon to study the tax methods based on the relation between vehicle weight and distance traveled.

The first penetration-macadam pavement used by the western state highway departments was pioneered by Baldock when he was Oregon's Maintenance Engineer in 1923. Massachusetts had imported the process from England, but work was slow because the entire operation was done by hand, even to spreading of the chips. Baldock helped devise an asphalt heater, and chip spreading was also mechanized. Production rose. Many a highway, particularly in eastern Oregon, is today a real and lasting example of the progress of that period.

Stands for Right

Since 1932, Baldock has been Oregon's State Highway Engineer. In the Chief's chair, he has dealt with many people; many politicians; many pressure groups. An interesting philosophy is the result of that experience.

First and foremost, Baldock urges all engineers, wherever they are, to resist anything which isn't right or just. Many situations come up which call for a stand on his part. Many times Baldock has simply used common sense and stood for what he thought was right. Usually he won out. Sometimes he lost, but when he did, he did so gracefully. In practically every case, time has vindicated his early judgment. To this day, Baldock fails to understand why an engineer should compromise truth or justice.

Highways as a whole are governed by rigid economic laws, says Baldock, and a highway system must be planned with these factors in mind if it is to be successful. Relations between highway cost and public benefit are applied to all Oregon road planning, and woe betide the project whose cost-benefit ratio is less than 1.0! Oregon is currently pushing construction on a fast new highway down the left shore of the Columbia River, between The Dalles and Portland. When that construction is criticized, Baldock can point to a cost-benefit ratio of 2.0, meaning that benefits are double the cost.

When Baldock gets roped in for a game of bridge, he plays the game with the same analytical engineer's approach. Opponents say that he is one of the toughest customers they have met; that he can take a hand of cards and squeeze out every trick possible to make. He does the same with his highway job.

Very much opposed to deficit financing and the whole "something-for-nothing" theory, Baldock takes pride in the efficiency of the Oregon Highway Department. The constant review of his department to eliminate deadwood is one of the things Baldock takes most seriously.

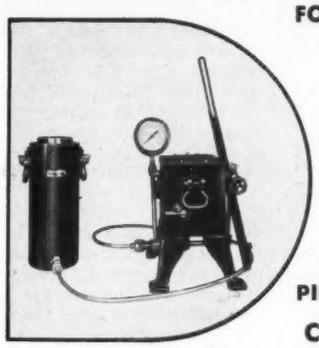
He makes numerous public speeches, for two reasons. First, he firmly believes public officials have a responsibility to the people in this regard. Second, his analytical engineer's approach has determined that public speaking improves the individual. If Baldock could give a word of advice to every young engineer still in college today, it would be "Do plenty of public speaking, and learn to write clear, persuasive English."

For many years Baldock has been a member of the Legislative Committee of the AASHO and has appeared before the road committees of the Congress of the United States to point out the road needs of the nation; he has also assisted in the preparation of road legislation. He is the author of the formula first used in the 1944 Road Act for the apportionment of Federal funds to the several states.

In 1949, when his department was called upon to furnish advice to the State Legislature on Baldock's favorite

(Continued on next page)

DUDGEON HYDRAULIC **JACKS**
FOR DEPENDABLE PERFORMANCE



"JACK" in any direction
. . . . PUMP in only one

Needle release valve
for pin point "lowering"

FOR: PILE TESTING
UNDERPINNING — BRIDGE
PIPE PUSHING — SOIL TESTING

CAPACITIES TO 600 TONS

WRITE FOR CATALOGS — ASK ABOUT OUR RENTAL SERVICE
OTHER PRODUCTS: Hydrostatic Test Pumps • Single and double acting Tension Jacks • Wire Stressing Jacks . . .

RICHARD DUDGEON, INC. EST. 1850
789 BERGEN STREET BROOKLYN, NEW YORK

This Diesel's built to go a million miles *(and work thousands of "stand-by" hours!)*

GMC
GASOLINE & DIESEL TRUCKS
½ TO 20 TONS
GM GENERAL MOTORS
Your key to greater hauling profits

No place is GMC's new "Million-Miler" Diesel more at home than when working under the truck-killing conditions of heavy construction work.

For here is where the sustained "go" of GMC's 150- and 225-BHP power plants are really called upon to keep socking home the heft to the pay load.

But the big factor is the *patient power* that purrs under the hood of this "Jimmy" Diesel – thousands of hours of stand-by power, idling – ready to spring into driving motion the moment the foreman signals "take her away!"

With new automatic Fuel Modulation that takes the lugging and the sludging out of low-speed Diesel operation – new freer-breathing, carbon-free scavenging action, husky 80 c.c. unit injection of fuel and a new high governed speed of 2100 r.p.m. – *no wonder it's the ruggedest, workingest, longest-lasting engine ever yoked to a real truck!*

Why not let your GMC dealer give you all the facts on this fleet of new Diesel "Million-Milers." Figure out the power savings you'll get—both in terms of miles *and hours* of real, long-time, rough-and-tumble work!

GMC Truck & Coach Division of General Motors

Oregon's Baldock: Western Road Pioneer

(Continued from preceding page)

subject, highway taxation, he demonstrated his capacity for practicing what he preaches with this comprehensive analysis, which is worth quoting in full:

"The requirements of the road-user group dictate the scope of the state highway system, the standards of design which are employed in its construction, and the service life or frequency in which it must be reconstructed. In other words, the amount and character of use dictate the cost. This statement constitutes a simple fundamental relationship which is frequently lost sight of in the maze of claims and counterclaims of special classes within the road-user group.

"If the cost is measured by the amount and character of use, and a tax is imposed to recover the cost, it then follows that the tax should be measured by the amount and character of use. This principle is not new in Oregon, but it has never been clearly recognized and understood. Before we attempt to develop a method of applying a tax in accordance with this principle, let us analyze the principle so that we may perhaps better understand the factors involved and the quantities with which we are working.

"It is important to bear in mind that 'use', as a factor in this principle, is defined as a physical operation having a direct relation to the cost of providing the facilities. For other purposes 'use' might be defined variously as a privilege, or the product of occupancy and time, or any number of things, but for the purpose of distributing the cost we must consider only those features of use which govern the cost. These are (1) vehicle miles and (2) weight. Vehicle miles govern the amount of facilities required and the standards of alignment on which they are constructed. Weight governs the strength which must be incorporated into the design of roadways and structures. Since, in actual operation, there can be no vehicle miles without weight, 'use' becomes a combination of weight and vehicle miles. This combination also determines the maintenance requirements and fixes the service life of the improvements.

"Cost is the other basic factor in this principle. For this purpose it may be defined as the total annual requirement in funds to construct, to maintain, and to reconstruct road facilities to accommodate the demands of road use. It is obvious that the initial cost, whether great or small, would be a minor consideration in the long run if it were not for the fact that the life of the improvement is definitely limited. Since roadways do depreciate through use, the initial cost becomes a measure of the replacement cost, and the service life of the improvement determines the portion of reconstruction cost or amount of depreciation which must be recovered each year to perpetuate the system.

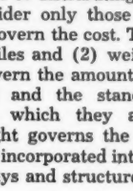
"Now if we can relate 'use' to this annual cost of construction, depreciation, and maintenance, we should have a sound and lasting principle of taxation. Our considerations can then be fixed on refinements of the method and on administrative efficiency. It is a fundamental precept of highway engineering that roadways and structures must be designed and constructed to carry a predetermined load or weight. It is manifest that the greater the design load, the greater will be the cost of construction and reconstruction. From time to time arguments have been presented to the effect that minimum standards of construction for highways and bridges are established by other factors, such as the elements, and that weight should not be a factor. The fallacy of such thinking is obvious.

"From the foregoing, it is inevitably concluded that the cost per mile increases with the weight, and that the product of weight and mileage equal the total cost. It logically follows that

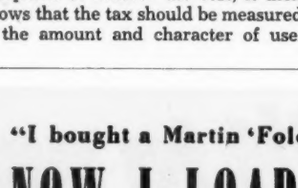
(Continued on next page)

"I bought a Martin 'Folding Gooseneck' Trailer

NOW I LOAD ANYWHERE ...AND FAST!"



reports Ed Warsaw, Fort Wayne contractor



Warsaw's truck and Martin Trailer arrives to pick up equipment . . .

Unfolding quickly and easily, the "Folding Gooseneck" provides a perfect ramp for all types of equipment . . .

Equipment in place four minutes after arrival, the truck picks up loaded trailer with winch power . . .

Rolling — the loaded unit is low, providing maximum stability under all conditions.

"You can never get into a spot where you can't load a Martin 'Folding Gooseneck' Trailer," says Ed Warsaw, of the Warsaw Construction Co., Fort Wayne, Indiana. "I've loaded every type of equipment over the time-saving 'Folding Gooseneck'."

"The Neoprene rubber mounted tandem floats the load over rough roads we travel. Awkward cranes and draglines ride secure and safe, easily clearing the low bridges in our area. That safety angle is an important one — there's little or no danger of tipping with the 'Folding Gooseneck'. We're sold on this trailer!"

You'll be sold, too, when you see "this trailer" in action! Ask your Martin "Caterpillar" Dealer to show you the Martin "Folding Gooseneck" Trailer's money saving features . . . or write to Martin Machine Co., Kewanee, Illinois, U. S. A.

MARTIN Trailers

KEWANEE ILLINOIS, U. S. A.

Play it Safe!

FASTEN WIRE ROPE WITH

CROSBY CLIPS

America's largest-selling DROP-FORGED fasteners!

SIZES for ⅛" to 3" WIRE ROPE
DISTRIBUTORS EVERYWHERE

AMERICAN HOIST & DERRICK CO.
ST. PAUL 1, MINNESOTA

perfect measurement

Rough "approximations" won't serve an architect, engineer or contractor in the serious business of estimating concrete or determining the proper mixing capacity of a drum.

You want to know *instantly, exactly and in precise units of measurement.* And you can know, simply by reading the AGC Rating Plate on all standard mixers and pavers.

Mixer Manufacturers Bureau

Affiliated with the Associated General Contractors of America, Inc.

CHAIN BELT COMPANY, Milwaukee, Wis.
CONSTRUCTION MACHINERY CO., Waterloo, Iowa
THE FOOTE CO., INC., Nunda, N. Y.
THE JAEGER MACHINE CO., Columbus, Ohio
THE KNICKERBOCKER CO., Jackson, Mich.
KOEHRING COMPANY, Milwaukee, Wis.
KWIK-MIX COMPANY, Port Washington, Wis.
THE T. L. SMITH COMPANY, Milwaukee, Wis.
WORTHINGTON PUMP & MACHINERY CORP., Ransome Division, Dunellen, N. J.

a weight-mile tax is the only equitable means of distributing the cost among the users, and that the rate per weight mile should be graduated upward as the weight is increased.

"Beginning with the lightest weight class, or automobile user, we find a satisfactory method of applying a weight-mile tax already in successful operation. Elements of this class are of approximately the same weight, generally operate as single units, burn the same kind of fuel, and there is little variation in the amount of fuel consumed per weight mile. The present gasoline tax, as applied to this class, is equitable and successful—not because it is a fuel tax, but because the consumption of gasoline by individuals in this class provides a reasonably accurate method of measuring their use of the highways, and, therefore, a suitable means of measuring and collecting their proportionate share of the cost.

"In the motor-transport group the situation is entirely different. They are of different weights, they frequently operate as combinations or trains of vehicles, they use different kinds of fuel, and there is a radical difference in the amount of fuel consumed per weight mile. Therefore, it is clear that consumption of fuel in nowise measures the use of all elements and weight classes within this group. To equitably distribute the cost burden among members of this group by means of a fuel tax, it would be necessary to set up a different rate for each of all possible combinations of vehicles within each weight class—an unworkable method.

"A system of flat fees to recover part or all of the tax obligations of this group is currently in effect throughout the United States. It has much to recommend it in the way of simplicity, but little to defend it as a basis of equity. It may be adjusted to return the proper proportion of cost for each weight class, but it imposes a penalty upon every individual within that class who uses the roads less than the average number of miles for that class. It actually constitutes a gift to every individual in the same class who uses the roads more than the average number of miles. Regardless of any supporting arguments for such an arrangement, it can hardly be called equitable.

"If our objective is simplicity of administration, there is no need to look further, but if our objective is equitable distribution of the cost, we are irrevocably committed to the weight-mile use tax. I do not believe that the administrative problems identified with application of the weight-mile tax are insurmountable. It is unlikely that a perfect motor-transport law will ever be enacted—that would be one which would administer itself automatically, provide all the funds needed, distribute the cost equitably, and collect the tax without inconvenience to the taxpayer. Compromises will have to be made, and experience will enable us to improve on the details of administration. But I believe we should adhere to the principle of equity, which is represented by the weight-mile tax."

Oregon's method of translating the weight-mile tax theory into practice has been to establish traffic checking stations strategically throughout the state highway system. Thorough and frequent mileage reports are also required of all large trucking carriers. Reports are then coordinated with the checking information.

Is it effective? Oregon's present weight-mile tax structure is so workable that every indication points to the possibility of its being copied by several states in the near future. Truckers will tell you that it is an impossibility for them to move on the Oregon highway system without the State's knowledge.

Baldock is a Colorado product by birth, but an Oregonian by choice. Born in Trinidad. Colo., July 6, 1889, he received his early schooling in that state. He received his B.S. degree from the University of Colorado in 1938, after finishing work interrupted years before. In 1939, a thesis on highway taxation won him a degree in civil engineering from the University of Colorado, and in 1946 an honorary degree of Doctor of Science was awarded to him by the University of Oregon.

Baldock's first engineering work was not on highways. From 1908 to 1915, he tried railroad, mining, hydroelectric, and logging engineering. From 1915 to 1932 he rose quickly through the Oregon Highway Department ranks, serving as transitman, resident engineer, division engineer, state maintenance engineer, assistant chief engineer, and finally becoming chief engineer in 1932.

"Who's Who in America" lists many of Baldock's accomplishments and affiliations. He is a member of the New York Academy of Science, a member of the Newcomen Society of England, a past president of the American Asso-

(*Concluded on next page*)

At DIGGING and LOADING— It's a PIPPIN!

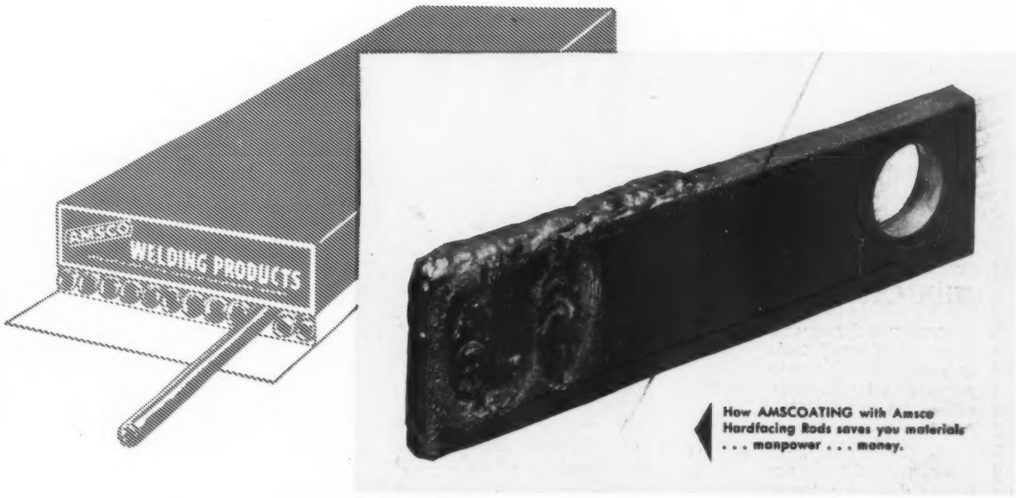
The PIPPIN EXCAVATOR — a combination digger and loader attachment for Ford and Ferguson tractors —

- Back hoes, front hoes, shovels and loads
- Converts from back to front hoe in five minutes
- Digs 7′ deep. Back hoe buckets available from 15″ wide to 37″ wide.
- Bucket capacity 1/5-yd.
- Bucket elevates to 14′ above grade
- Load swings laterally to 110 degrees

For greater work capacity and lower costs, get a PIPPIN!

WRITE FOR CIRCULAR

PIPPIN CONSTRUCTION EQUIPMENT CO., Inc., White River Junction, Vt.



How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

How to make short work of a long shutdown!

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

This AMSCOATED Pulverizer Hammer has cut replacements over 90% to date!

Big savings are bound to result when you can reduce shutdowns and replacements. For example, coal pulverizer hammers in a Southern plant were lasting about 5 days before a complicated dismantling job for replacement was necessary. Some hardfacing methods had been tried, but the results still weren't good enough to bring costs down to earth.

Recently test hammers were AMSCOATED with an Amsco Rod specially developed for this type of service . . . and the hammer you see above is now making service life history! Why?

The plant superintendent reports that the AMSCOATED hammers are lasting 14 times longer than plain hammers . . . over twice as long as hammers hardfaced by any other method tested . . . that they've been in service 72 days and are still going strong!

This actual example is one of many AMSCOATING applications that are resulting in *lower* maintenance and replacement costs. . . . *higher* production. Write today for catalog on dollar-saving AMSCO rods and the name of your nearest AMSCO distributor.

AMSCOATING

THE RIGHT WAY TO SAY HARDFACING

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

395 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

Oregon's Baldock: Western Road Pioneer

(Continued from preceding page)

ciation of State Highway Officials, a member of the Executive Committee of the AASHO, a member of the Executive Committee of the Highway Research Board, a member of the ASCE, and a member of the Tau Beta Pi honorary fraternity.

Baldock had three children—Robert, Bonnie, and Dorothy—by his first marriage. After his first wife's death, Baldock married Verona Watson Lehmer, a charming and talented widow. For many years the Lehmers and Baldocks had been close friends.

The Baldocks find time for bridge, travel, and golf, but the thing first and uppermost in Baldock's life will always be highway building and finance.

There is nothing accidental or colorful about Baldock's nickname of "Sam", which many engineers all over the nation call him. "It was simply a name tagged on me by some of the University fellows, and its origin is long-since forgotten," Baldock explains.

Two outstanding tributes recently paid to Baldock were the AAA award for "Distinguished Service to the Motorists of Oregon" which was presented in Portland early in 1951, and the George S. Bartlett Award presented last December at the AASHO meeting in Miami, Fla., "For Outstanding Contribution to Highway Progress". This is considered the highest award a highway engineer can receive.

Quick-Hardens Steel With Ordinary Torch

Two compounds for emergency surface-hardening of small tools or parts with an ordinary welding torch have been announced by Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing, N.Y.

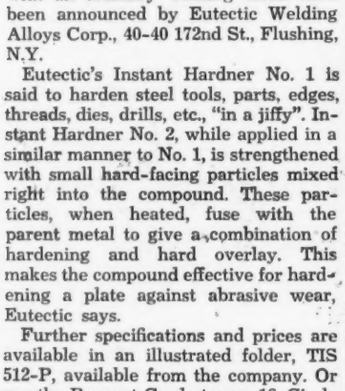
Eutectic's Instant Hardner No. 1 is said to harden steel tools, parts, edges, threads, dies, drills, etc., "in a jiffy". Instant Hardner No. 2, while applied in a similar manner to No. 1, is strengthened with small hard-facing particles mixed right into the compound. These particles, when heated, fuse with the parent metal to give a combination of hardening and hard overlay. This makes the compound effective for hardening a plate against abrasive wear, Eutectic says.

Further specifications and prices are available in an illustrated folder, TIS 512-P, available from the company. Or use the Request Card at page 16. Circle No. 765.

New Safety Hat Pads

Sponge-rubber shock absorbers that may be attached to hard hats for increased protection from side blows are now made by E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif. The rubber pads are fastened to self-adhering strips and applied by pressing the strips firmly against the hat crown, under the headband. With this method, Bullard points out, standard headband assemblies may be used and the individual head-sizing feature of the safety hat is retained. The pads are available in complete sets for installation on hats in use, or they can be factory-installed to order.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 750.



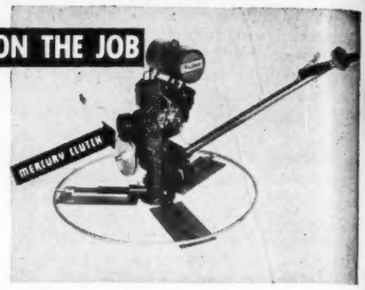
These Bullard sponge-rubber shock absorbers may be attached to a hard hat under the headband to protect the wearer against side blows.

Industrial Flooring

An 8-page brochure on Plastic Rock flooring is announced by United Laboratories, Inc., of Cleveland 12, Ohio. It contains information on how and where to apply Plastic Rock flooring, as well as technical data about the product itself.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 770.

PUT A MERCURY CLUTCH ON THE JOB



A Mercury Automatic Clutch makes starting easier and prevents stalling on a Cement Floor Finishing Machine.

INSURE LOAD-FREE STARTING AND IDLING

If your construction equipment and machinery is powered by a gasoline engine, insure its trouble-free performance at all times by installing a Mercury Automatic Clutch between the engine and the load. The engine starts easily, picks up the load smoothly, and does not stall when idling or when overloaded.

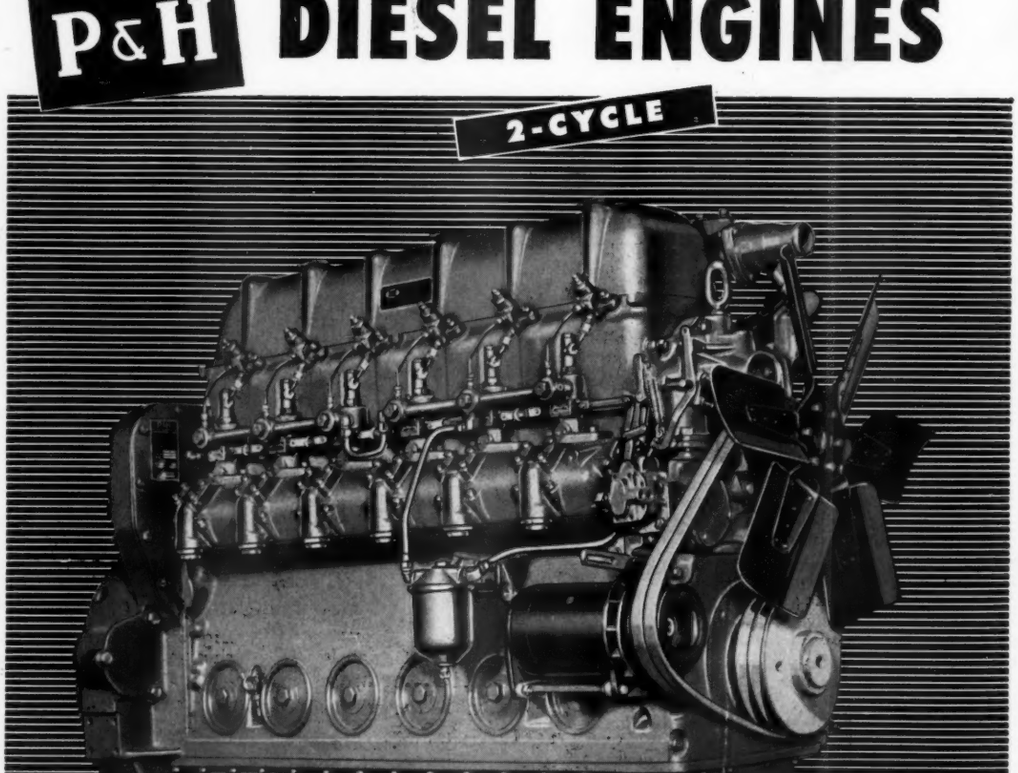
For all original equipment using gasoline engines . . . or electric motors . . . investigate the advantages of a Mercury Automatic Clutch. Easily installed on jobs in the field, in most cases. Write for Catalog CM-2

MERCURY CLUTCH DIVISION

AUTOMATIC STEEL PRODUCTS INC. · CANTON 6 · OHIO

P&H DIESEL ENGINES

2-CYCLE

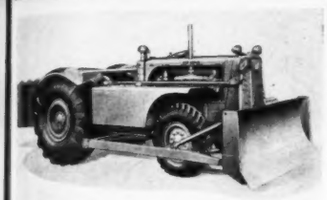


FEWER PARTS

MEAN FEWER TROUBLES FOR YOU

You'll like the way so many parts have been designed *out* of P&H Diesels. It makes them simpler, more dependable for all types of service. It makes them easier to understand, easier to service. It lets you cut parts inventory — and costs, too! It's another important reason why experienced users are switching to P&H Diesels . . . *standardizing on them.* Five models: 1, 2, 3, 4, and 6-cyl. For literature, write P&H Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
PORT WASHINGTON WISCONSIN, U. S. A.



Caterpillar has brought out a No. 10S straight-blade bulldozer for its rubber-tired DW10 tractors.

Wheel-Type Tractor Gets New Bulldozer

The No. 10S bulldozer, a straight-blade unit for rubber-tired DW10 tractors, is available from Caterpillar Tractor Co., Peoria 8, Ill. Similar in design to other Caterpillar bulldozers, it includes blade, push arms and braces, hitch, sheave support and heavy-duty radiator guard, combination cable, and sheave group. Trunnions for the new model are included in the weight box and frame group, which differs widely from the company's track-type tractors.

The weight box and frame group is a substantial assembly, fabricated of heavy structural-steel plate mounted with the DW10 tractor frame. The group provides support for the bulldozer trunnions at each side of the tractor, and includes a heavy box at the rear of the tractor for counterweights. The four counterweights weigh 7,000 pounds and give more traction on the tractor drive wheels. The counterweight box has a towing hitch so that the tractor can also be used for drawbar purposes. The new No. 10S bulldozer uses a Caterpillar No. 21 cable control.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 789.

Belt-Conveyor Idlers

A new bulletin on Rex belt-conveyor idlers and machinery is available from Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis. A large cross-section drawing illustrates the features of steel and cast-gray-iron idler rolls. Two pages of general engineering information provide help in designing and specifying belt idler equipment.

The bulletin covers the new Rex Style No. 33RA return-belt training (self-aligning) idler, Style No. 40 and 46 steep-angle troughed-belt idlers, and Style No. 33G and 33WC steep-angle troughed-belt training (self-aligning) idlers. It includes data on lubrication materials and techniques, and on maintenance procedures in general.

This literature may be obtained from the company by requesting Bulletin No. 51-81, or by using the Request Card at page 16. Circle No. 738.

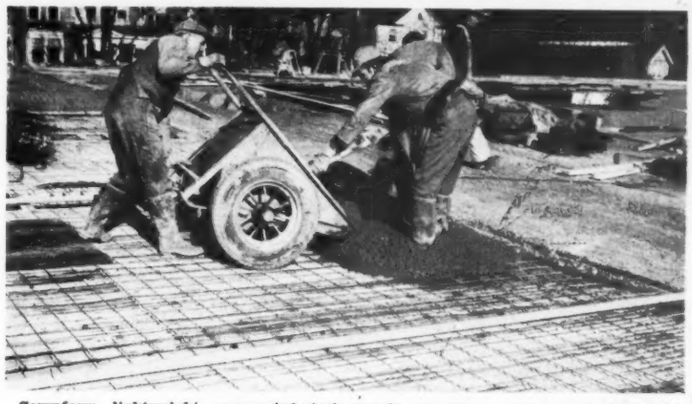
York Engineering Elects

The following officers have been elected by York Engineering & Construction Co., Pittsburgh, Pa.: James MacGregor, President; Charles MacGregor, Vice President; Philip M. Weber, Treasurer; and J. Donald Cook, Secretary. The company, which was formerly a partnership, was incorporated on July 1, 1951. It offers general engineering and contracting services in the design of buildings, foundations, and equipment for industrial plants.

Corrugated Steels Form Concrete Floor

Lightweight corrugated-steel panels that provide a permanent form in concrete floor and roof construction are made by Granco Steel Products Co., Granite City, Ill. Corruform is a high-strength corrugated-steel base for floor and roof slabs over joists, beams, purlins, and rafters. Furnished with fasteners for all standard joists and beams, the product is made in a standard weight and a range of heavy-gage steels. The heavier steel, with deeper corrugations, carries floor slabs of structural-weight concrete for spans up to 4 feet.

Many special advantages are claimed for this product: a guaranteed average strength of over 100,000 psi; lightweight rigid sheets that can be quickly placed; elimination of wood forms and clean-up; sturdy working areas for the trades prior to concrete pouring; a bright decorative underside that makes an attractive exposed ceiling; and simplified purchase of a standard product.



Corruform lightweight corrugated-steel panels provide a permanent form in concrete floor and roof construction.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 787.

ROETH

CONCRETE VIBRATORS
MOUNTED ON WHEELBARROW CHASSIS
Write for details and prices
ROETH VIBRATOR CO.
1737 Farragut Ave.
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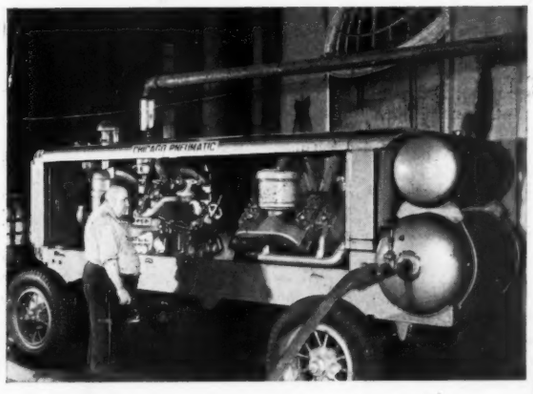
RITZ Carlton

CP COMPRESSORS
WORKING IN DINING ROOM
OF FORMER RITZ-CARLTON HOTEL

ANYWHERE YOU NEED COMPRESSED AIR



It's a year's job to raze the famous old Ritz-Carlton Hotel, on Madison Avenue, New York, and all air for the demolition work is being supplied by two Diesel-driven CP Air Compressors — one of 600 cfm capacity and one of 315 cfm.

CP Portable Compressors—providing ample air on any location — incorporate four outstanding advantages: dependability, minimum operating cost, low maintenance, long service life.

Gradual speed regulator adapts engine speed to air demands, minimizes engine wear, gives smoother performance, effects fuel savings ranging from 15% to 35%.

CP Portable Compressors are available in gasoline and Diesel driven models from 60 to 600 cfm.

Write for detailed information

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Scrapers Move Dirt On Road-Grading Job

Topping Material Placed on Subgrade, Followed by Gravel Base Course, Then Double Bituminous Surface Treatment

• BY this fall, Mississippi State Route 43 was paved all the way from Crossroads, on State 26, to Picayune, on U. S. 11—a 22 mile stretch. Formerly a gravel roads, on State 26, to Picayune, on U. S. last year by state maintenance forces. The upper end, 7¾ miles long, has been under contract to Gex & Cue of Bay St. Louis, Miss., on a low bid of $134,-101.86 to the Mississippi State Highway Department. The contract included grading, drainage, culverts, base course, and a double bituminous surface treatment.

The project was located in Pearl River County, beginning at Crossroads and running south to meet the existing pavement that was put down last year. The new road followed closely the old gravel road, 24 feet in width, which had a good alignment as to vertical and horizontal curves. Only in a few instances where some curves were flattened was a new location necessary. Construction got under way on February 26 of this year, and was scheduled for completion by early fall.

Built with a 30-foot roadway, the improvement has a 20-foot double bituminous surface treatment with a liquid seal. The parabolic crown in the pavement is 2½ inches. Flanking 5-foot shoulders on each side are pitched at the rate of ½ inch to the foot. The pavement rests on a semigravel base course, 5 inches thick x 22 feet wide, which was primed for 22 feet, or a foot beyond the pavement on each side. Roadbed topping material is under the base course, extending under the shoulders on each side to the slope line.

C. & E. M. Photo

On the Mississippi State Route 43 job, a Link-Belt Speeder dragline with a 35-foot boom and a Hendrix ⅝-yard bucket loads roadbed topping material to a Chevrolet truck with a Galion body. Gex & Cue of Bay St. Louis, Miss., was the contractor.

Grading Operations

Drainage structures included one reinforced-concrete box culvert, 6 x 3 x 39 feet long, and about 1,000 linear feet of reinforced-concrete culvert pipe, 18 to 36-inch diameter. Grading started as the culverts were being installed, and was finished by June. Estimated unclassified excavation totaled 77,714 cubic yards, the cut and fill quantities for the roadway balancing out so that no borrow was required.

The bulk of the dirt was moved by two Caterpillar tractor-scraper units—a D6 with a No. 60 scraper averaging 6 yards a load, and a D7 with a No. 70 scraper averaging 8 yards a load. Average haul was around 600 feet. Another D6 tractor served as a pusher in loading the scrapers part of the time. Fills were built up in evenly spread 6-inch lifts that were compacted to 95 per cent Proctor density with a Caterpillar tamping roller pulled by an International ID-9 rubber-tired tractor. A 1,000-gallon tank truck was on hand to wet the fill when necessary, thus insuring the optimum water content.

In the grading the maximum fill was 18 feet and the maximum cut was 10 feet, but the average for both was around 6 feet. Shaping of the subgrade was done by a pair of Caterpillar motor graders, a No. 12 and a No. 112. Fill slopes are 2 to 1, while in the cuts the

(Concluded on next page)

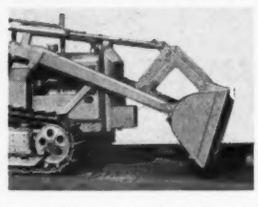
of Cost-Cutting Features

When it comes to cutting loading costs . . . stepping up profits, the Oliver Model "B" Crawler and Ware Loader is "loaded" with *plus* features.

Take the hydraulically controlled bucket, for example. 110° bucket rotation and 28° "tilt back" give you a full bucket every time. "Breaking out" action is 3 times the lifting effort of the loader . . . a particularly important advantage when loading out hard-packed material or for stripping operations. Bucket level is automatically maintained when lifting load, preventing wasteful spillage. You can control speed of discharge . . . fast or slow, easily and gently. And, even with the "tilt back" action, you still have a 32° (from vertical) dump angle . . . a control range no other loader can match. You get bigger loads . . . *faster!*

The Oliver-Ware "B" loader was designed and built exclusively for Oliver Model "B" tractors. Its ideal fit with the tractor eliminates unneeded dead weight and assures maximum stability for the entire unit. The Oliver semi-rigid axle allows limited oscillation of the track, eliminating the possibility of track-frame distortion. A hydraulic shock absorber smooths out pressure surges . . . prevents damage to loader and tractor parts.

For complete information on how the Oliver-Ware Model "B" tractor loader can cut costs for you, see or write your Oliver Industrial Distributor.



Plenty of power, plus the wide angle of bucket rotation, assures faster, more positive digging. 28° "roll back" assures maximum break-out action for a full bucket every time.

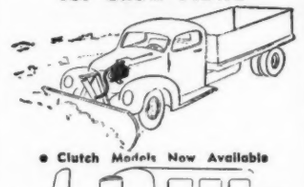
THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

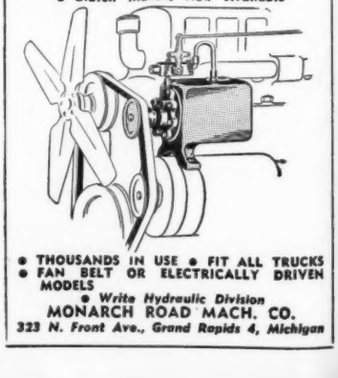
A complete line of industrial wheel and crawler tractors

THE OLIVER CORPORATION

POWER HYDRAULICS for Snow Plows



• Clutch Models Now Available



• THOUSANDS IN USE • FIT ALL TRUCKS
• FAN BELT OR ELECTRICALLY DRIVEN MODELS

• Write Hydraulic Division

MONARCH ROAD MACH. CO.

323 N. Front Ave., Grand Rapids 4, Michigan

front slopes are 4 to 1 to a V-type ditch that is 2½ feet deep. Backslopes in cuts are 2 to 1.

Topping and Base Course

Over the subgrade is a layer of roadbed topping material, a sand-clay borrow averaging 12 inches in depth. This good binding and supporting soil was obtained from two pits, entailing hauls of 2½ and 2 miles respectively. The topping was excavated with a Link-Belt Speeder dragline equipped with a 35-foot boom and a Hendrix ⅝-yard bucket, and loaded into a fleet of 7 assorted-make trucks averaging 5 yards a load.

On the road the topping was spread in 6-inch lifts by the tractor-dozer and motor graders, then compacted by a pneumatic-tire roller pulled by the ID-9 tractor. Still another pit was opened up to provide the semigravel material required for the base course. This 5-inch course, handled in the same way as the topping, is nearly all gravel, with a small amount of sand-clay soil.

Bituminous Seal

After the base course was laid, it was primed to a width of 22 feet with MC-1 asphalt, applied at the rate of 0.25 gallon to the square yard by a Littleford 1,000-gallon distributor mounted on a GMC truck. After the prime had cured out, the double bituminous surface treatment was put on in two applications, using AC-15 asphalt for each shot. The first application went on at the rate of 0.4 gallon to the square yard, and was covered with ¾-inch slag put on from spreader boxes, 0.5 cubic foot to the square yard. The aggregate was rolled in by a 7-ton tandem roller to form a mat ¾ inch thick.

The mat was sealed with the second shot of AC-15, put on by the distributor at the rate of 0.25 gallon to the square yard. Cover for the seal consisted of ¼-inch slag, 0.25 cubic foot to the square yard, rolled in by the tandem roller.

Quantities and Personnel

The major items in the 7¾-mile highway contract included the following:

Unclassified excavation	77,714 cu. yds.
Roadbed topping	56,019 cu. yds.
Semigravel base course	1,000 lin. ft.
RC pipe, 18 to 36-inch	21,570 cu. yds.
Cutback asphalt for prime	36,234 gals.
Asphaltic cement, surface treatment	70,820 gals.
Cover aggregate	1,819 cu. yds.
Seal aggregate	979 cu. yds.

Gex & Cue employed an average force of 20 men on the job under the direction of Pat Dixon, Superintendent.

For the Mississippi State Highway Department, Walter E. Gray was Project Engineer. The project was located in the Hattiesburg District of which George L. Lemon is District Engineer. The Department is headed by R. A. Harris, Chief Engineer. S. A. Tomlinson, Jr., is Construction Engineer.

Feeders and Conveyors

A detailed 84-page catalog on electric vibrating feeders and conveyors designed to handle many materials has been prepared by The Jeffrey Mfg. Co., 970-99 N. Fourth St., Columbus 16, Ohio. It describes the design and operation of the Jeffrey-Traylor equipment, and provides technical information about many standard and special applications.

It points out that these units are designed to handle materials of any size in quantities up to thousands of tons per hour, and it highlights the instant and absolute control of material flow electrically. It includes general dimensions, general specifications, and illustrations for all of the units.

This literature may be obtained from the company by requesting Catalog 830, or by using the Request Card at page 16. Circle No. 723.

Wearing Your Safety Hat?

To stimulate wearing of protective hats, Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pa., has prepared a new illustrated booklet. It points out the vital importance of adequate head protection by listing eight representative cases in which workers wearing Skullgards have escaped serious injury, even death, when struck by falling objects. A section of the booklet is devoted to the care of the MSA Skullgard; another discusses design features of the protective hat.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 717.

Data on Threaded Bars

A bulletin on threaded bars has been issued by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill. "Ryerson Threaded Bar Service" gives data on size range (¼ to 2½-inch diameters), lengths, kinds of thread, bending, types, and finishes of steel bars that are furnished threaded. The bars include anchor bolts, hook bolts, bracing rods, and sag rods. The bulletin also illustrates some of the accessories that are furnished: turnbuckles, nuts, washers, and tank lugs.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 755.

Represents Plywood Group

W. L. Griebeler, former Assistant Professor of Agricultural Engineering at Oregon State College, has joined the Douglas Fir Plywood Association, Tacoma, Wash., as California field representative. He will offer market-level advice and assistance on plywood uses to distributors, builders, and other users.

GUTH . . . rebuilds diesel castings

guaranteed to be equal to, or better than, new castings! Popular cylinder heads for exchange shipments are available for immediate delivery.

GUTH COMPANY McPHERSON, KANSAS

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SERVING THE NATION FROM ITS CENTER

WRITE FOR ADDRESS OF NEAREST DEALER

LESS DOWNTIME for Tire Changes
LESS UPKEEP for Tire Repairs
LESS OUTLAY for Tire Replacements

It's a Fact... It Costs You Less to Run

Firestone

OFF-THE-HIGHWAY TIRES

IT COSTS you less to run Firestone Tires because their treads are extra tough to withstand cutting and abrasion, extra thick to deliver more miles of service. And, whether your work is in sharp rock, loose earth or slippery clay, Firestone Tires have treads especially designed to meet your particular requirements.

It costs you less to run Firestone Tires because their extra-strong Gum-Dipped rayon cord bodies are the next thing to trouble-free. Protected against impact by four special tread plies and guarded against cuts and snags by double-thick sidewalls, they run longer without interruption, remain in better condition for additional retreading.

Firestone Tires cost you no more to buy than other popular makes, cost a considerable amount less to run. Make a note now to buy your next tires from your nearby Firestone Headquarters.

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over NBC

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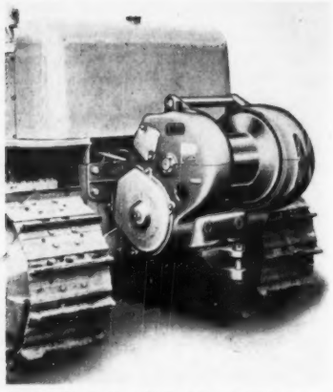


The Carco G winch for general construction fits tractors in the 80 to 120-belt range. New features include concealed cable controls, smooth braking action, and choice of gears for high or low range of line speeds.

Heavy-Duty Winch Has New Improvements

Concealed cable controls, a new toggle-type brake, and a choice of standard or slow-speed gears are features of the improved Carco G winch announced by Pacific Car & Foundry Co., Renton, Wash., for tractors in the 80 to 120-belt-horsepower range.

The heavy-duty winch appears in a new streamlined case; exterior nuts and bolts are recessed. Drum flanges are shrouded to minimize cable damage. Other changes in case design are said to increase the strength of the Carco-metal casting, yet keep weight to a minimum. Cable controls leave the tractor fender and winch case free of projections. Flexible cable controls also permit a choice of locations for the control stand.

The new toggle-type self-energizing brake is designed to give the operator increased braking leverage and permit controlled lowering of the load. When released, it leaves the brake band completely separated from the drum. An automatic brake is available with the Carco G winch as extra equipment; this lets the operator set his brake before pulling in the load. The brake takes effect as the tractor clutch is disengaged, preventing the load from slipping back. A Carco fairlead can be bolted directly to the Carco G winch without welding or burning.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 760.

New Copying Machine

A new Copyflex machine has been announced by Charles Bruning Co., 100 Reade St., New York, N. Y. The Model 20 is designed for medium-volume production of prints from tracings, engineering drawings, and other large-sized technical originals. It is also adapted for copying large-sized records, balance sheets, charts, cumulative statistical statements, and reports.

The machine offers a 46-inch printing width with exposure speeds up to 95 inches per minute. This model requires no installation, just a connection to a 60-cycle 115-volt ac electric power line. Fifty and 25-cycle machines also are available. According to the company, operation of the Model 20 does not require any special training. The operator merely feeds the sensitized medium into the machine with the translucent original to be copied. Copies are processed by the machine and are stacked ready for use.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 766.

Bruning's Model 20 copying machine.

Acquires Highway Steel Plant

The plant of Highway Steel Products Co., Chicago, has become the ninth plant of United States Radiator Corp. and will be its Metal Products Division. Its manufacturing facilities, which U. S. Radiator recently acquired, include welding equipment, heavy stamping and forming presses, and a modern finishing department for bonderizing and enameling.

Just what you want for roadside development:—

THE RYAN POWER SOD CUTTER

Write for folder

K & N MACHINE WORKS, INC.

871 Edgerton St. St. Paul, Minn.

Investigate this rugged ONE-MAN machine that cuts 600 sq. yds. of sod per hour and SAVES up to 80% of labor costs

DARAKOTE *enables you to continue surface treatment, cold-patch and repair work right through the late Fall . . . despite cold, wet weather!*

Highway Departments throughout the country lengthened their paving season last Fall by using DARAKOTE—the anti-stripping agent that makes it possible for liquid bituminous materials to stick to cold, moist aggregates.

DARAKOTE prevents stripping under these adverse conditions, *even during heavy Fall rains,* by actually displacing the water from the surface of the rock. It permanently binds asphalt to the aggregate and to the road surface. It works equally well with asphalt cements, cut-back asphalts, road oils, road tars . . . on both acidic (siliceous) and basic (calcareous) types of paving aggregates.

Add extra days or weeks to *your* surface treatment, cold patch and repair season this Fall by using DARAKOTE! Write today for factual literature!

CONSTRUCTION SPECIALTIES DIVISION

DEWEY and ALMY Chemical Company

CAMBRIDGE 40, MASS. • CHICAGO 38 • SAN LEANDRO, CALIF. • MONTREAL 32

Ways to Get More Miles Out of Your Truck Tires

An interesting folder titled "Nine Ways to Get More Miles Out of Your Truck Tires" has been prepared by The B. F. Goodrich Co., Akron 18, Ohio. Here are a few of its tips on how to save "rubber dollars":

Selecting—Make sure the tire and the job are perfectly matched. Choose the size of tire you need—one that will meet maximum requirements, not just average hauls. Take advantage of extra-ply ratings when operating conditions are particularly rugged.

Inflating—When tires are not inflated to the recommended air pressure, the cord body is unable to do its job of flexing without injury. Overinflation does not compensate for overloading. It cannot add strength to the tire; in fact, it actually weakens the cord body by reducing its ability to absorb road shocks.

Loading—Breaks in the cord body in the tire can be the most expensive abuse. Overloading is the cause of many types of failure. A tire overloaded by 40 per cent will render only about 50 per cent of its normal service expectancy. The rated carrying capacity cannot be increased by inflating beyond the recommended pressure. Improper load distribution can also cause cord-body breaks. Although the gross load may not be too great, one axle, one side, or one wheel may be overloaded due to improper distribution.

Correcting mechanical irregularities—At the first sign of uneven tread wear, check and correct all mechanical irregularities. Out-of-round brake drums, bent or distorted wheels and rims, and too much toe-in or toe-out can cause tire damage.

Matching and Spacing duals—Improper matching of duals causes overloading of one of the tires and overheating, which may result in a blowout. Both the inside and outside tires in dual assembly should be matched to have the same inflated outside diameter and circumference. Although it is not always possible to do this exactly, the difference should not exceed ¾ inch in circumference or ¼ inch in diameter for tire sizes through 8.25. For tire sizes 9.00 and larger, a 1½-inch circumference or 1½-inch diameter difference is permissible. The smaller tire is always on the inside position. Also check the difference between the centers of the two tires and make sure they agree with recommended spacing.

Caring for tubes—Use new tubes with new tires. Be sure to mount the inner tubes correctly, and always use the proper size of tube. Always use a new valve core; never replace with a used one. Be sure to use an accurate tire gage when checking air pressure, and always clean the end of the valve before applying the air hose, to prevent dust and dirt being blown into the tube.

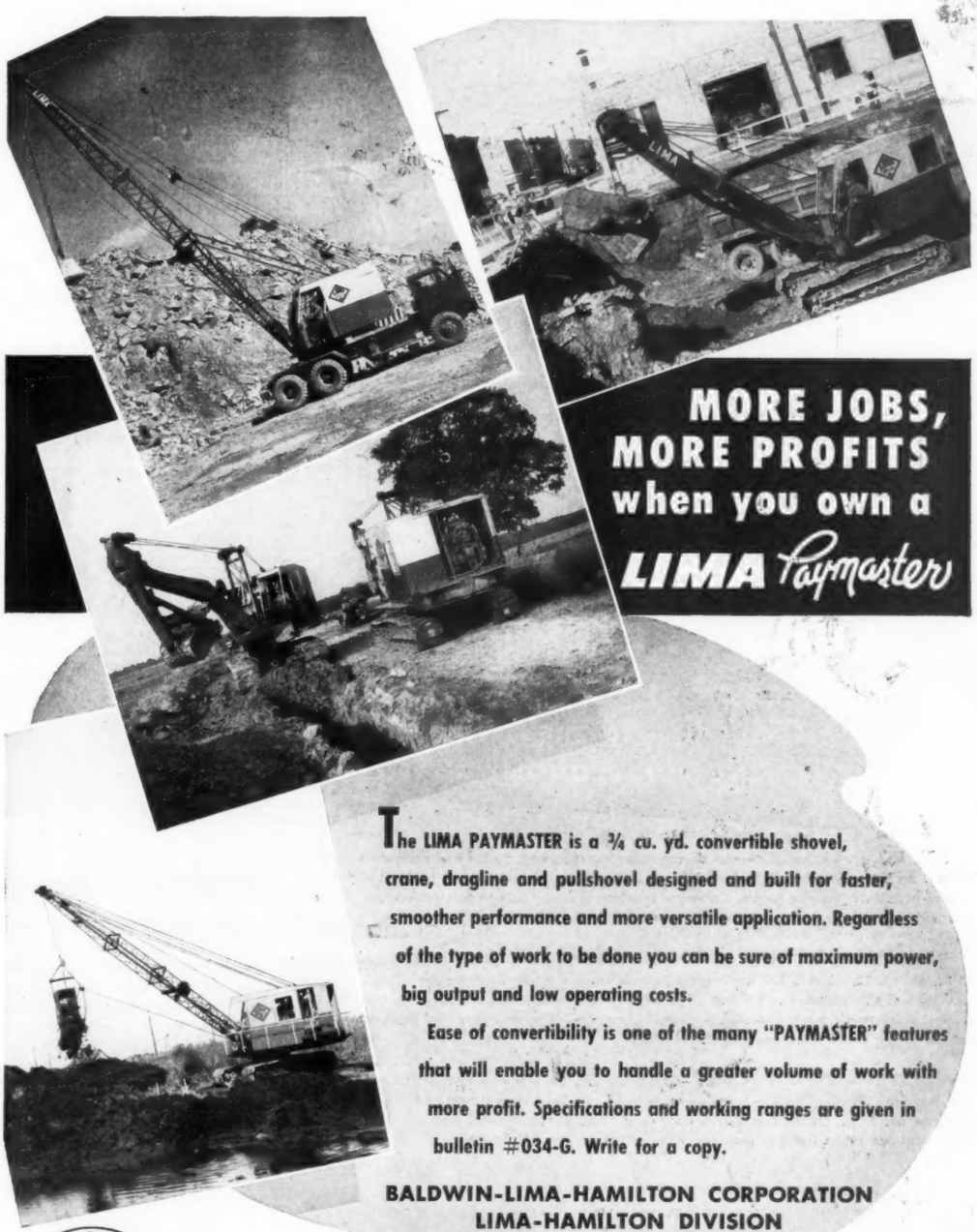
Rotating tires—Breaking in new tires on an easy position generally increases their over-all life. Therefore, new tires are often started at the front wheel. However, the movement of tires from front to rear positions depends upon the type of unit being operated. It is usually necessary to use tires with good nonskid tread design on drive wheels. Recommended rotation at various times during the service life should be followed closely.

Recapping and repairing—Recap when the last trace of the original tread design begins to disappear, so that you have a firm undertread to which the recap can be bonded. The smooth-tread mileage is not sacrificed—it is merely saved to be used when you decide to run the tire out. It is as false an economy to buy cheap recaps as to buy cheap new tires.

Driving—Good driving habits get more miles out of truck tires. Take it easy on rough roads. Do not drive over curbs by making too short a turn. Avoid riding the edge of the pavement. Anticipate stops and use the brakes gradually. Start slowly and do not spin wheels. Drive at moderate speeds. Check for flats and soft tires before starting and during each trip. Report evidences of misaligned wheels or other abnormal conditions noticed when driving the vehicle.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 724.

A Caterpillar diesel No. 12 motor grader spreads blacktop windrow on Wisconsin State Highway 13 alongside an historic old wind-powered grist mill, relic of pioneer days. The Douglas County Highway Department owns the rig.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MORE PROFITS
when you own a
LIMA Paymaster
The LIMA PAYMASTER is a ¾ cu. yd. convertible shovel, crane, dragline and pullshovel designed and built for faster, smoother performance and more versatile application. Regardless of the type of work to be done you can be sure of maximum power, big output and low operating costs.
Ease of convertibility is one of the many "PAYMASTER" features that will enable you to handle a greater volume of work with more profit. Specifications and working ranges are given in bulletin #034-G. Write for a copy.
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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Insufficient Warning Of Street Excavation

THE PROBLEM: *A motorist drove at night into an excavation in a street which was open to travel. A subcontractor's foreman had failed to place barricades and keep pot flares burning in the traffic lane on which the motorist approached. Was the street-reconstruction contractor liable for the injury?*

THE ANSWER: Yes. (Downey v. Union Paving Co., 184 Fed. 2d 481, decided by the United States Court of Appeals, Third Circuit.)

On the contractor's appeal from a damage award in favor of the motorist, the Court of Appeals decided:

The jury could determine that the motorist did not directly cause his own injury by failing to keep his car under such control that it could be stopped within assured clear distance ahead. Flares were burning on the other side of the excavation, and there was an illuminated "Keep to the Right" sign where the motorist approached; but his attention was distracted by the blinking lights of a car approaching him.

The contractor was not exonerated from liability because it was the subcontractor's contract duty to maintain proper warnings, etc. The contractor had retained supervisory control over the guarding of the excavation. Furthermore, it is the law in Pennsylvania (as in many other states) that one who undertakes to do work in a public place that will endanger the public unless it is done carefully cannot escape liability for resulting injury by subletting the job.

Public-Work Proposals, Elastic Specifications

THE PROBLEM: *A city called for bids for the design and construction of an incinerator and garbage-reduction plant. Comprehensive plans and specifications showed the general design and scope of work required. They afforded a basis for competitive bids for alternative types of plants, but rendered it necessary for bidders to frame their own detailed plans and specifications. Was award of a contract to the successful bidder illegal, on the ground that there was an insufficent basis for fair competitive bidding?*

THE ANSWER: No. (Corcoran v. City of Philadelphia, 70 Atl. 2d 621, decided by the Pennsylvania Supreme Court.)

The court approved the trial judge's view that, although the plans and specifications provided by the City "did not prescribe minute details of design and construction, they" showed "an acceptable arrangement of the plant and its component parts. Within these limitations, engineer contractors were to prepare and submit their own detailed

(Continued on next page)

FOR ROAD BUILDERS—who demand longer-lasting and trouble-free equipment there is no better buy than Heltzel steel forms, Heltzel portable bulk cement plants and Heltzel portable aggregate plants. On every concrete highway and airport project you will find men who know the dollars and cents value of Heltzel equipment.

PORTABLE BATCHING PLANTS—Portable aggregate plants in capacities of 30, 45, 52, 72, 85 and 100 tons. Portable bulk cement plants in capacities of 100, 200, 300 and 400 barrels — and 9 sizes of portable recirculators to assure reserve storage to meet every requirement. Standard batchers will service 34E pavers — or dual batchers for the fastest batch truck operation obtainable.

HIGHWAY-AIRPORT FORMS—Standard forms for highway and airport construction are all-welded steel — featuring wide tread, upturned base flange and 5 rigid supports per form. Heltzel's exclusive dual duty forms are demanded by contractors who want one set of forms to pour two slab thicknesses from 6" to 24."

Write for 9-piece kit of contractors' literature

HELTZEL

STEEL FORM & IRON CO.

WARREN, OHIO

Pipeline work: Hydra-Lift was designed and perfected especially for laying pipe. Smooth positive hydraulic action gives you accurate control, both swinging and lifting.

Paving jobs: Hydra-Lift pulls paving forms fast and cheap. There's plenty of room on the truck bed for stacking the forms; just pull the truck ahead and restring them.

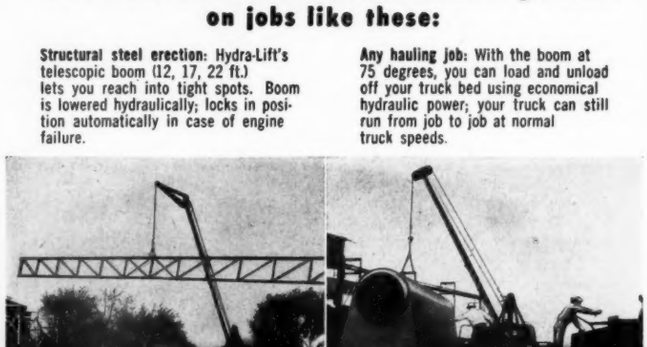
HYDRA-LIFT helps you

bid lower and make more profit

on jobs like these:

Structural steel erection: Hydra-Lift's telescopic boom (12, 17, 22 ft.) lets you reach into tight spots. Boom is lowered hydraulically; locks in position automatically in case of engine failure.

Any hauling job: With the boom at 75 degrees, you can load and unload off your truck bed using economical hydraulic power; your truck can still run from job to job at normal truck speeds.



HYDRA-LIFT fits any truck

The world's newest and lowest-priced hydraulic truck crane, Hydra-Lift fits on the frame of any truck, 1½ tons or over. It requires only about 38" behind the truck cab, leaving the bed free for all normal purposes. Operation of the Hydra-Lift is by simple lever controls, either inside or outside the truck cab. Hydra-Lift has a rated capacity of 6,400 pounds with adjustable outriggers extended; boom swings 180 degrees, lifts through an arc of 100 degrees. Dow Chemical Co., Standard Oil Co., public and private utility companies, underground contractors, building contractors, paving contractors, transfer and storage companies and many other industries are now using Hydra-Lift profitably. Nothing can compare with it for performance or price!

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PITMAN MANUFACTURING COMPANY

300 West 79th Terrace **Kansas City, Missouri**

☆ Let Your Dollars Fight Polio ☆

plans and specifications, suggesting other possible arrangements or modifications, which had to be analyzed by the City's consulting engineers, and approved or rejected by the City. This method of obtaining bids was lawful and justified under the circumstances," bringing "into competition both the price and quality of the thing to be furnished."

Unread Release Not Binding Because of Misrepresentation

THE PROBLEM: *Money was due a company under two contracts. The company signed a printed release which it intended to have cover one of the contracts only. It left it up to the released party to fill in the blanks in the release, and it did not read the document before signing it. But the blanks were so filled in as to show release under both contracts instead of one.*

Could the release be set aside by court action on the ground that the signature was obtained through misrepresentation? Or did the failure to read before signing prevent its being set aside on this ground?

THE ANSWER: Yes, it could be set aside on the ground of misrepresentation. (Peter W. Kero, Inc. v. Terminal Construction Corp., 78 Atl. 2d 814, decided by the New Jersey Supreme Court.) The Supreme Court upheld judgment in favor of plaintiff in his suit to collect the balance due him. It applied these general rules of law:

One signing a written document is generally presumed to have read and understood what he signed unless his signature was obtained by fraud or other imposition. But when its contents are deliberately misrepresented to him, and he so pleads in defense of his suit, he can avoid the effect of the document—even though reading it would have disclosed the fraud.

Rules Excavation Agreement Superseded, Not Compromised

THE PROBLEM: *Plaintiff agreed to use his excavating machine at $5 per hour on a sewer job contracted by defendant. Difficulty in placing sheeting in the trench led to an agreement for open-cut excavation at a footage price. Later, plaintiff also agreed to do backfilling at a footage rate. Apparently the agreement was not written down, and dispute arose as to its terms. Defendant held that it was a compromise agreement and not enforceable because plaintiff, by failing to do certain ditching and backfilling, failed to keep his part of it. Was defendant entitled to prevent plaintiff from collecting on the modified agreement?*

THE ANSWER: No. (Fenner v. Bolema Construction Co., 47 N. E. 2d 662, decided by the Michigan Supreme Court.)

The court fully recognized that, where a dispute arising under a contract is compromised by the making of a new agreement, one party cannot enforce the compromise agreement unless he has performed his part of it. But the court decided that the evidence showed that the first agreement in this case was not compromised but superseded by the second; and that the jury was warranted in concluding from the evidence that plaintiff fully performed his part of the new agreement.

Road Barricade Should Be Commensurate With Danger

THE PROBLEM: *Should the type of warning or barricade used on a road dangerous to travelers conform to the degree of danger involved?*

THE ANSWER: Yes. (Rosier v. State, 50 So. 2d 31, decided by the Louisiana Court of Appeals, Second Circuit.)

In this case the court upheld an award against the State on account of the death of five occupants of a car that was washed off the road by floodwaters on a bridge approach.

The court said that "no hard and fast rule can be laid down as to the type of warning or barricade that should be erected by road contractors or state agencies to warn the public of travel hazards ahead. The warning should be commensurate with the danger." If a bridge is out, need for a complete barricade is indicated. If a road is impassable only with extreme danger to life, a barricade with appropriate explanation ought to be erected.

Unspecified Completion Date No Excuse for Cancellation

THE PROBLEM: *An owner under a construction contract sought to justify breach of the agreement after it had been partly performed by the contractor. He held that the contract could be canceled at will by either party because it did not fix any time within which the job was to be completed. Was his reasoning valid?*

THE ANSWER: No. (Stephens v. Horn, 236 S. W. 2d 953, decided by the Kentucky Court of Appeals.)

The court applied this generally recognized rule: when a contract does not fix a time for performance, the courts will assume that performance within a reasonable time—depending

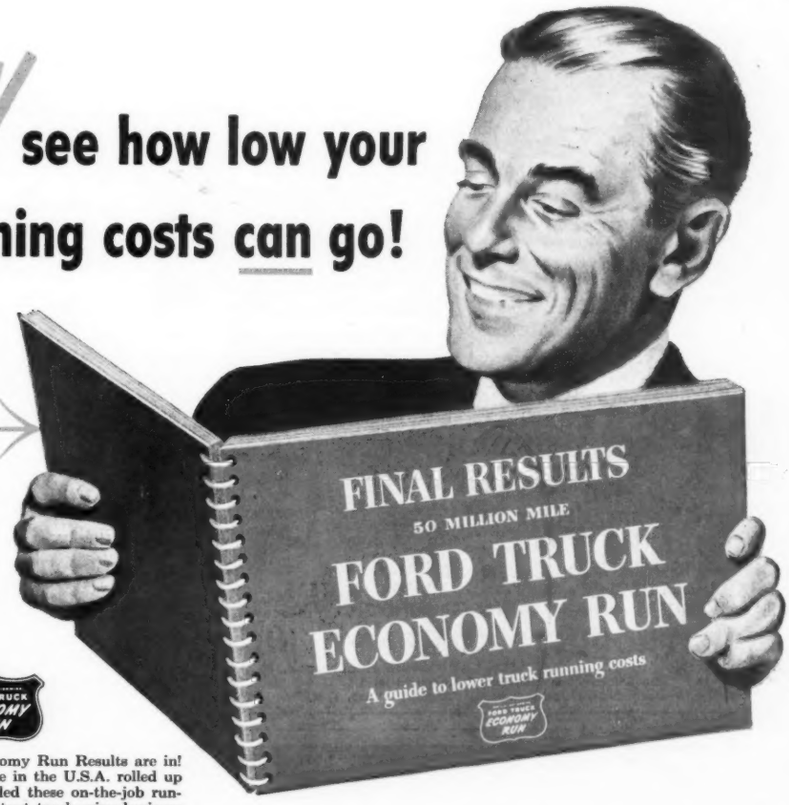
(Concluded on next page, col. 3)

WINSLOW—PORTABLE TRUCK SCALE
"THE CONTRACTORS' SPECIAL SCALE"

For use at temporary and permanent locations—at stock piles and by bituminous material contractors at the job site.
Capacities: 15-18-20-30 Ton—Write us for your nearest distributor

Mfd. by: WINSLOW SCALE COMPANY
P. O. Box 1198 Terre Haute, Indiana

Now see how low your truck running costs can go!



A FORD DEALER EXCLUSIVE!

This 144-page book is a record of over 5,500 cases . . . on-the-job truck running costs in over 195 kinds of truck-using businesses. It's another Ford first, and *only* your Friendly Ford Dealer has it!

FORD TRUCK ECONOMY RUN

Final Ford Truck Economy Run Results are in! Owners from every state in the U.S.A. rolled up 53,783,930 miles—recorded these on-the-job running costs. Every important truck-using business was represented in the 6-month Run, every size Ford Truck, every kind of road and load condition.

New "Final Results" book gives black-and-white evidence of how *little* it can cost to run a Ford Truck in *your* kind of work!

Now check your truck costs against "par"! The "Final Results" book is a practical "yardstick" that lets you compare your running costs with the actual experience of other truck users in your kind of job.

See these cost-to-run figures today! There's no obligation. Your Ford Dealer will be glad to show you over 5,500 reports . . . arranged so that you can easily find cases with loads and working conditions similar to yours. See actual running costs for gasoline, oil, maintenance and repairs, paid for by actual truck operators, on actual jobs!

It may save you real money! See how important it is to have the truck *exactly* right for your job. Before you buy any truck, see written evidence of how little Ford Trucks cost to run in *your* type of business . . . in *any* type of business!

"I truck 8 tons of sand for less than 4½¢ a mile!"

—says Adolph Ulmer, Jr., Ulmer Sand & Gravel Co., Beaver Dam, Wisconsin

Mr. Ulmer was one of over 250 heavy construction operators who entered the nationwide Ford Economy Run. His POWER PILOT equipped Ford F-7 Dump Truck traveled 18,956 miles at a cost of only $825.30 for gas, oil, maintenance and repairs!

You'll find his complete running cost record on page 62 in the "Final Results" book. See how *your* truck running costs stack up with other heavy construction men from all parts of the country—men whose loads and working conditions are similar to yours. See evidence of Ford Truck Economy!

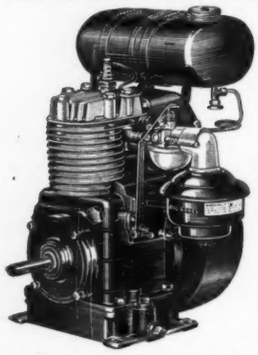
FORD TRUCKING COSTS LESS

. . . because Ford Trucks last longer! Using latest registration data on 7,318,000 trucks, life insurance experts prove Ford Trucks last longer!

See "Ford Festival" starring James Melton on NBC-TV.

Hyatt Expands in Jersey

In answer to the increasing demand for roller bearings in the national defense program, the Hyatt Bearings Division of General Motors Corp. plans to expand its Harrison and Clark Township plants in New Jersey. New structures at the Clark Township plant will double existing facilities, giving an additional 390,000 square feet of floor space. Alterations to the Harrison plant will net 12,000 more square feet of manufacturing area. The start of construction will depend on availability of materials.



MODEL K-12-2, *3 H. P., 4-cycle, single cylinder, air-cooled. Length 14", width 14", height 19". Weight 43 lbs.*

RELIABLE POWER FOR:
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Prevent tie-ups, delays and costly shut downs!

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AEROIL PRODUCTS COMPANY, INC.
75 Wesley Street South Hackensack, N. J.
Also Chicago, San Francisco, Dallas, Seattle, Pittsburgh, Dedham (Mass.), Jacksonville, Los Angeles & Forty Fort, Pa.

Avoid Legal Pitfalls

(Continued from preceding page)

upon the underlying facts—was mutually intended.

Plaintiff was allowed damages for defendant's breach of a contract to construct a coal chute. Defendant had caused breach by discharging plaintiff when he demanded that defendant perform his agreement to make progress payments.

Void Paving Assessment Against U. S. Property

THE PROBLEM: *A paving contractor took as part payment for his work a special-assessment certificate covering an assessment against a Federal building property. Could he force payment of the certificate?*

THE ANSWER: No. (United States v. City of Charleston, 93 Fed. Supp. 748, decided by the United States District Court, Southern District, West Virginia.)

The court said the contractor was presumed to know that there was no legal right to assess the Federal property for the paving. He was also bound to know that the City could not be held liable on a theory that by issuing the certificate it rendered itself liable. The opinion serves as a reminder of this well established rule of law: one dealing with a municipality is bound to know just which official acts are legal and which are not.

Contractor Retains Sums From Sub for Unpaid Bills

THE PROBLEM: *On a state airport job, the prime contractor bound himself by the contract and a bond to pay all labor and material bills; the state was permitted to retain enough money to cover such bills. When a subcontractor left some bills unpaid, the prime contractor retained from a sum due the subcontractor enough to cover the bills. Was he entitled to do so?*

THE ANSWER: Yes. (Berkal v. M. DeMatteo Construction Co., 98 N. E. 2d 617, decided by the United States District Court, Massachusetts.)

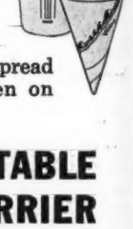
The subcontractor held that the contractor could not retain the money because the labor and material creditors had not filed their claims in court as permitted by a Massachusetts statute. The court rejected this contention and said the fact that the creditors had not filed did not affect the issue. Filing, it said, is unnecessary when, as in this case, there was no dispute as to the amount due.

Contractor Co-Defendant With Village in Injury Suit

THE PROBLEM: *A pedestrian was injured on a village street when he fell at a defective spot where a sewer had been laid. He sued the village. The village, in turn, sought to make the sewer contractor a co-defendant; should he be proved responsible for the accident by failing to backfill the sewer trench properly, the village hoped to secure idemnity from him. Was it entitled to make him a co-defendant?*

THE ANSWER: Yes. (Zeuner v. Village of Bronxville, 104 N. Y. Supp. 233.)

SAVE TIME ON THE JOB WITH DIXIE CUPS or VORTEX CUPS



Clean, safe Dixie Cups, and cone-shaped Vortex Cups, protect health, help check spread of colds, keep men on the job.

DIXIE PORTABLE WATER CARRIER SAVES TIME

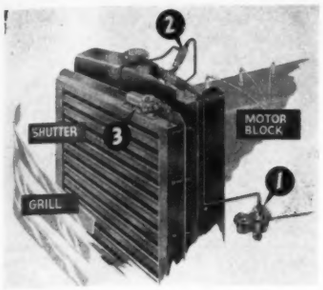
Brings water *to* the men...keeps crews *on* the job. Insulated to keep water cool for hours. Built for years of rugged use. Cover and lining of stainless steel for cleanliness. Uses either flat-bottom Dixie Cups or cone-shaped Vortex Cups.

SEND FOR FREE ILLUSTRATED FOLDER

"DIXIE" AND "VORTEX" ARE REGISTERED TRADE MARKS OF THE DIXIE CUP COMPANY

DIXIE CUP COMPANY
Easton, Pa.

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN



The Kysor automatic radiator shutter maintains proper engine temperature within a 6 to 8-degree range regardless of air temperature and vehicle load. No. 1 is the air filter; No. 2 the shutterstat; No. 3 the cylinder.

Proper Heat Control Reduces Engine Wear

The Kysor Heater Co., Cadillac, Mich., points out that, contrary to general belief, engines run most efficiently when a high operating temperature is maintained. It has been determined conclusively, the company says, that the amount of wear which takes place within the cylinder wall of a combustion engine and throughout the operating parts is directly related to the time needed to heat up the engine. A uniform high heat also produces greater power, economy, and functional life. The company's engineers report that an engine operating at 160 degrees F wears twice as fast as one operating at 180 degrees. At 140 degrees the wear is 4 times as great.

Technical data books prepared by Kysor show how positive engine temperature control can be effected through the use of automatic radiator shutters. The Kysor radiator shutter is composed of four basic units together with fittings and other miscellaneous installation requirements. These units are the shutter itself, an air cylinder, an air filter, and a shutterstat.

The radiator shutter permits control of all the air flowing through the radiator and engine compartment. It is operated by an air cylinder mounted directly on the shutter, where possible. The air filter provides clean air for the operating mechanism and is accessible for servicing and draining. The shutterstat, mounted in the upper hose line, controls the air flow to open and close the shutter according to engine temperature requirements. The usual shutterstat setting is 180 degrees, and until the engine coolant reaches this temperature the shutterstat air valve remains open, permitting no air to enter the engine area until the proper temperature has been established. When the temperature reaches 180 degrees (or any other specified temperature), the shutterstat opens the radiator shutter, permitting a free flow of air. Proper temperature is maintained within a 6 to 8-degree range regardless of air temperature and vehicle load conditions.

Detailed data on the application of this unit for automotive or industrial engines are available from the company. Or use the Request Card at page 16. Circle No. 722.

Barnes Buys on West Coast

Barnes Mfg. Co. of Mansfield, Ohio, has bought the Shasta Pump Co. in Oakland, Calif.—now known as Barnes-Shasta Pump Co. and operating as a wholly owned subsidiary. The new firm will make Shasta pumps as well as the complete Barnes line. Better delivery to west-coast customers, plus line expansion, were Barnes' reasons for the merger.

Barnes' former West Coast Manager William Stillwell is now Sales Manager of Barnes-Shasta. J. E. Piccardo, former President of Shasta, is operating Vice President of the new Barnes-Shasta.

New Handbook Covers Cost-Control Methods On Construction Work

The cost-conscious contractor and engineer, whether he's a large or small operator, will be interested in the handbook "Construction Cost Control" prepared under the auspices of the American Society of Civil Engineers. It provides just about all the answers to construction accounting and cost-control problems that are common to all organizations.

Well illustrated and supported by charts and specimens of accounting forms, this 97-page book covers the complete cycle of estimating, accounting, distributing, and analyzing all operational and overhead costs. Its co-authors, Howard P. Maxton, Arnold O. Babb, and Donald J. Leitch, have had many years of practical experience in the construction industry. They realize that each active organization has its own system, but hope that some of their ideas and procedures can be advantageously integrated, in whole or in part, with the existing system.

The manual is intended primarily to help those with limited experience round out their knowledge and increase their contribution to the industry. Many methods cited in the book are in common use and were selected because they are time-tested. The manual includes sections on preliminary estimating, budgeting, classification of construction cost accounts, distribution of costs, control of costs, time and motion studies, and financing and tax problems.

"Construction Cost Control" is available from the American Society of Civil Engineers, 33 W. 39th St., New York 18, N. Y. The cost is $4.00 to ASCE members and $5.00 to nonmembers. Quantity orders are available to schools at lower cost.

Be READY!—for SNOW EMERGENCIES

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FASTER • SAFER • CLEANER
SNOW REMOVAL
with
DAVENPORT-FRINK
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V-Blade Sno-Plows for all sizes and makes of motor trucks—also tractors, motor patrols and locomotives.

Straight Blade or Reversible Blade Sno-Plows are desirable for lighter snows or for clearing one side of street or highway at a time.

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CHEVROLET
ADVANCE-DESIGN
TRUCKS

Whatever the job you have for a truck, Chevrolet has the truck that's *right* for your job! It's a new Chevrolet Advance-Design truck, built to cut your trucking costs down to rock bottom. Saves you money when you buy, because the purchase price is low. Saves money right along, because no other truck in its price class offers the great combination of *ruggedness, durability and economy* you get in Chevrolet. Just look at the extra value features that make Chevrolet trucks *stand up better, handle easier, cost little to run and maintain.* Your best truck deal is the deal you get on a Chevrolet Advance-Design truck at your Chevrolet dealer's.

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TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS—for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • NEW TORQUE-ACTION BRAKES—for light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—for medium-duty models • NEW TWIN-ACTION REAR BRAKES—for heavy-duty models • NEW DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

Snow? Let Her Come, Says Pennsylvania

A state-wide snowfall in Pennsylvania this winter will bring into action 12,000 men with 2,426 trucks, 2,572 blade and V-type plows, 27 rotary plows, 10 blower-type plows, 309 other types of plows, 108 tractors, 1,505 wagonettes, 392 graders, 42 bulldozers, and 91 miscellaneous units. (Some 2,763 of the 7,179 vehicles are leased.) To move and control this equipment, Pennsylvania is relying heavily on her new radiotelephone system consisting of about 350 combination receivers and transmitters, a central station atop Dauphin Mountain, and a land station in each of the 67 counties. (See C. & E. M., August, 1951, page 64.)

During the summer, plows were readied for attachment to the vehicles, and 14,725,450 feet of snow fence were prepared. About 600,000 tons of cinders have been piled at critical points along the highways. Now that the frost is on the pumpkin the equipment is being rigged for a fast attack on snow, beautiful snow.

The schedule calls for initial clearance of practically all mileage on which the average daily traffic is 100 vehicles or more. After these roads have been cleared, equipment will move to the secondary roads, since it is department policy to open all roads for rural mail carriers, school busses, ambulances, and general traffic as quickly as possible.

The wagonettes and their crews are usually first on the job. As a snow or ice storm begins, they proceed to the cinder stacks, and coat curves, grades, and other critical spots with abrasives. This winter to keep motorists from sliding into the rear of their equipment, the cinder and plow crews will drop flares. As soon as a motorist passes a flare—which will burn for about 20 minutes—he will know snowfighters are ahead and will have time to slow down or stop. Flashing lights on the plows will give him further warning.

In 1923 when Pennsylvania had only 1,400 miles to clear, she spent $91,000 on snow removal. Last year, with 41,000 miles of state highways, she spent $9,245,690.

Improved Motor Oil

A heavy-duty, detergent-dispersant motor oil has been introduced by The Standard Oil Co. (Ohio), Midland Bldg., Cleveland 15, Ohio. Sohio HQD is produced from solvent-extracted base stocks blended with foam inhibitors, pour-point depressants, V. I. improvers, oxidation inhibitors, and rust-prevention and detergent-dispersant additives. It is suitable for any type of internal-combustion engine where an automotive motor oil is recommended, the company says, and will clean and condition the engine as it operates.

Other features cited: antiacid action to reduce engine wear, reduced oil consumption, increased engine power and greater gasoline mileage, high resistance to thinning at high temperatures and to thickening at low temperatures, and unusual "clingability" to metal.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 781.

Chain and Sprocket Data

A new catalog on roller chains and sprockets has been issued by Morse Chain Co., 7601 Central Ave., Detroit 8, Mich. It lists prices and available sizes of types A, B, and C sprockets, and gives pertinent information on roller chain from ⅜ to 2-inch pitch. The catalog also includes data on drive selection, service factors, installation, and service.

This literature may be obtained from the company by requesting Catalog No. C 55-50, or by using the Request Card at page 16. Circle No. 728.

Cummins-Chicago Appoints

Cummins-Chicago Corp. announces that Mitchell A. Kapland, Vice President, has been placed in charge of sales activities for all four divisions of the corporation. Mr. Kapland, who joined the Cummins organization in 1949, will be responsible for supervising sales policies and programing for all branch offices, representatives, and distributors of the Portable Tool Division, the Business Machines Division, the Fred W. Wappat Division (Mayville, N. Y.), and the Government Division.

A second announcement by Cummins-Chicago Corp. covers the promotion of Robert E. Mitchell to Field Sales Manager of the Portable Tool Division. Mr. Mitchell will take charge of sales training activities and programs for distributors and branch offices of this division throughout the country.

Hoisting-Tower Bulletin

An informative bulletin describing tubular steel hoisting towers has been prepared by Beaver Art Metal Corp., Box 792, Ellwood City, Pa. Statistics show how Beaver's "through bolt" system of section assembly and extensive use of welding reduces the number of parts required for erecting the towers. This system is also said to increase over-all strength and safety.

The heavy-duty tower has a live-load capacity of 5,000 pounds and height limit of 1,200 feet. The light-duty tower has a 3,200-pound capacity and 201-foot height limit. Technical data are included in the bulletin.

This literature may be obtained from the company by requesting Bulletin T-6, or by using the Request Card at page 16. Circle No. 734.

Surfa-slick
Patent Applied For
SELF-HEATING ASPHALT SMOOTHING IRON

HOT IN TEN MINUTES
HOT ALL DAY LONG

Contractors! This lightweight, rugged, simple, time and money saving smoothing iron will pay for itself in a few days use.

No more building and tending fires on your asphalt jobs!

• RUGGED • ECONOMICAL
• SIMPLE • LABOR SAVING
• SAFE • COMPACT

Dealer Inquiries requested.

J. E. WOODS MFG. CO.
1516 First Street
San Fernando, California

"Tag Master"
"Tops" in Bucket Control

As your clamshell "flies through the air with the greatest of EASE," watch the eyes of the "sidewalk superintendents" POP!

You, too, will be delighted with the EASE with which you *cast* the clamshell, or *snub* it, or *twist* it, getting into hard-to-reach corners and picking up hard-to-manage rocks.

You'll find the tagline pull *uniform* at all bucket levels and *adjustable* to fit any job.

In addition you can use your TAG-MASTER as a *dipper-trip!*

Some of these advantages YOU NEVER HAD BEFORE . . . unless you have already used a TAG-MASTER!

For more details about this combination tagline winder and dipper trip, mail the coupon below.

MORIN MFG. CO., INC.
WEST SPRINGFIELD, MASS.

Send "TAG-MASTER" details to—

Name .....

Address .....

Make—Size & Model of Machine

You name the job....

CARVER has the PUMP

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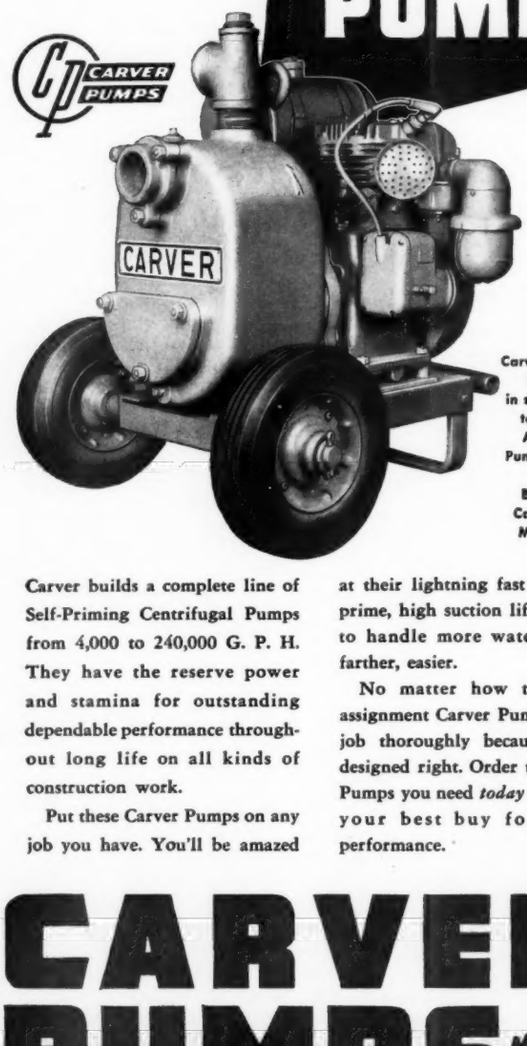


Carver Self-Priming Pump available in sizes from 4,000 to 240,000 GPH. Also Diaphragm Pumps up to 6,000 GPH. Ask for Bulletin No. 110 Carver Pump Co., Muscatine, Iowa.

Carver builds a complete line of Self-Priming Centrifugal Pumps from 4,000 to 240,000 G. P. H. They have the reserve power and stamina for outstanding dependable performance throughout long life on all kinds of construction work.

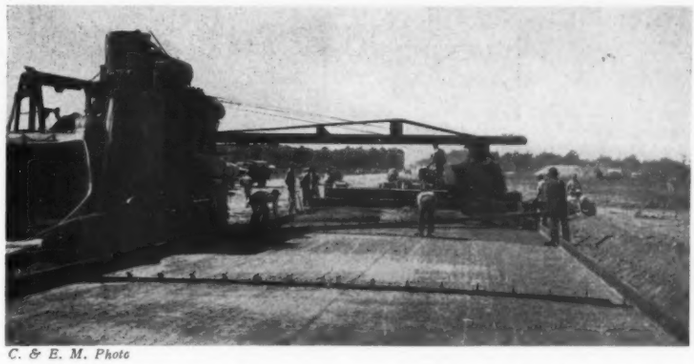
Put these Carver Pumps on any job you have. You'll be amazed at their lightning fast automatic prime, high suction lift, capacity to handle more water, faster, farther, easier.

No matter how tough the assignment Carver Pumps do the job thoroughly because they're designed right. Order the Carver Pumps you need *today* — they're your best buy for better performance.

CARVER PUMPS Muscatine Iowa

Three Miles Rebuilt, Paved With Concrete

Section of Airline Highway From New Orleans to Baton Rouge Is Reconstructed; Project Is Graded for Dual Roadway



C. & E. M. Photo

A Koehring 34-E Twinbatch paver drops a batch of concrete on the Airline Highway relocation in Louisiana. T. L. James & Co., of Ruston, La., was the contractor.

• A THREE-MILE section of the 81-mile Airline Highway connecting New Orleans and Baton Rouge, La., was relocated this year to eliminate a curving, narrow stretch of rough pavement in Ascension Parish. The new pavement is of plain portland-cement concrete, 24 feet wide, laid on the easterly half of a graded dual roadway. For the present, both directions of traffic will use the new surfacing since no paving has been laid on the westerly half. U. S. routes 61 and 65 are both carried on the Airline Highway.

The Louisiana Department of Highways awarded a contract for the relocation to T. L. James & Co., Inc., of Ruston, La., on its low bid of $337,535.94. The 3-mile project began at Prairieville and ran northwesterly to the south end of the bridge over Bayou Manchac. The new location lies west of the original route.

Grading for the dual roadway got under way in September, 1950, was shut down for 2½ months during the winter rainy season, and was completed last spring. Paving started the last day of April, and was completed May 26. Some difficulty was experienced at the start of the work in obtaining the desired quantity of cement.

Grading

Some 19 acres of wooded growth were cleared for the new alignment located in the flat valley of the Mississippi River. Roadway excavation was slight, with most of the highway being built on shallow embankment, the two roadways separated by a depressed neutral ground. This center strip varies in width from 28 to 43 feet, and at the midpoint is at least a foot below the level of the adjoining pavement.

Special borrow material was hauled in to provide a base course for the pavement. This base has a minimum depth of 12 inches, and is composed mostly of sand and gravel meeting A-4 soil designation. The dirtwork was handled by 14 Tournapulls, 8 bottom-dump Euclids, and 3 draglines working the borrow pits. Tamping rollers pulled by crawler tractors compacted the base.

The 24-foot pavement has a 9-7-9-inch cross section crowned 1 3/16 inch at the center. The increase in slab depth from 7 to 9 inches occurs in the outside 3 feet 9 inches along the edges. Flanking the pavement on the outside is a 10-foot shoulder with a slope of one inch to the foot. From the shoulder the front slopes pitch 6 to 1, where the fills are under 2 feet in height, to a ditch 2 feet deep x 4 feet wide. Where the fills are higher, the slopes are 4 to 1. Inside shoulders are 6 feet wide, also with a slope of one inch to the foot.

Batch Plant

In preparation for the paving, the contractor set up a batch plant a little over a mile south of the north end of the job, on the east side of the new location. At the north end of the plant area was a Blaw-Knox aggregate bin holding enough sand and gravel for 35 batches. It was charged from stockpiles on either side by a Koehring 605 crane equipped with a 55-foot boom and a Blaw-Knox 1½-yard clamshell bucket. The Merrill Sand & Gravel Co. of Amite, La., supplied the aggregate—sand and a single size of gravel—from one of its plants 20 miles away. Delivery was made by truck.

At the south end of the plant area was a Johnson 150-barrel cement bin. Lone Star bulk cement was shipped by rail in cars to a siding of the Louisiana & Arkansas Railroad at Prairieville where it was unloaded into two covered trucks holding 70 barrels each. Following a 2-mile haul, the trucks discharged their loads into a wooden hopper at the top of a short ramp alongside the

(Continued on next page)

NEW, WHITE HALF TRACKS

Originally cost gov't $7,000. Now priced at such a very small fraction of that figure. With International K11 motor, 4-speed trans. with auxiliary 2-speed shift and super power low speed drive. Hydraulic brakes, 900-20 tires. Excellent for logging, skidding, construction work, house moving, dump work. Available with or without winches. We carry a full line of replacement parts.

Millions of G. I. Truck Parts

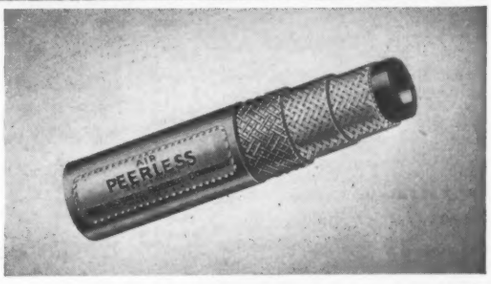
Wilensky Auto Parts Company

1226 No. Wash. Ave. • Minneapolis, Minn.

What's U. S. Rubber doing to save you precious time?

CONTRACTORS PREFER "U.S." Suction and Discharge Hose because it is so flexible and strong, yet lighter in weight than the ordinary hose. It can readily be rounded out, if crushed or flattened.

Contractors today, on big jobs or small, all over the nation depend on "U.S." products to speed up their work, and cut down operating costs. Each of these products is engineered for the particular job, depending on the service requirements. They are located in convenient branch stocks throughout the country for quick supply and delivery. Each product has been developed and perfected by "U.S." experts in construction work, men who have at their disposal the finest laboratories and immense research facilities. You may place the utmost confidence in "U. S." products for the construction industry.



U.S. PEERLESS Air Hose has oil-resistant synthetic rubber lining, and a tough, flexible, rubber compound cover with a resilient surface workman like to handle. Withstands both hot or cold oil in the air line.

U.S. WIZARD Square Braided Asbestos Packing is specially designed for reciprocating rods and plungers, valve stems, and centrifugal pumps handling steam, air, ammonia, oil, hot and cold water, chemicals and some acids. Provides the proper density and minimizes friction and wear of rods and shafts.

PRODUCTS OF U.S. RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Three Miles Rebuilt, Paved With Concrete

(Continued from preceding page)

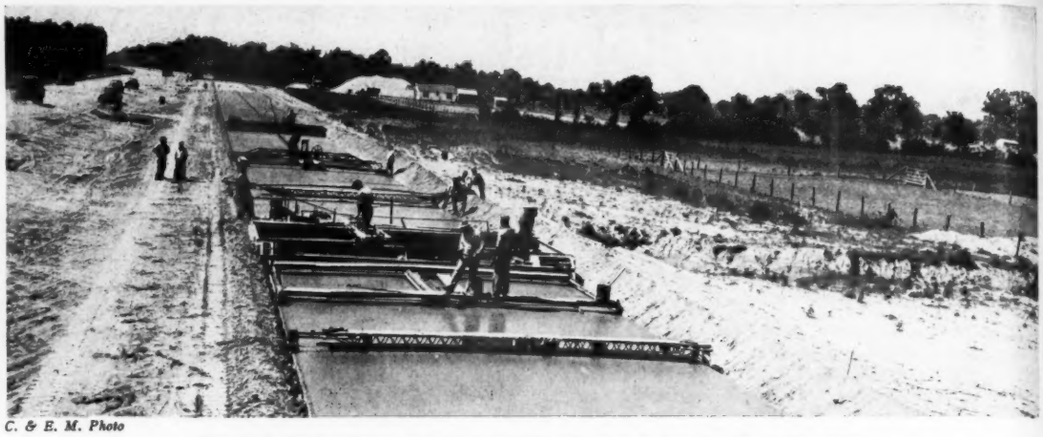
cement bin. The conventional worm gear at the bottom of the hopper and an enclosed elevator raised the cement to the storage bin.

Batches were hauled from plant to paver, an average distance of 1¾ miles, in 12 trucks holding two batches each. They backed under the aggregate bin, then drove through the cement bin in getting loaded. Water for the concrete and wetting the subgrade was pumped from Bayou Manchac at the north end of the job by a Jaeger 4-inch pump into four tank trucks holding 1,000 gallons. From the trucks the water was transferred to the paver through a 50-foot length of 2½-inch hose line.

Paving Preparations

The base course was carefully shaped to grade by motor graders, and trenches for the forms, 24 feet apart, were cut by a Cleveland Formgrader. Over 3,000 linear feet of Blaw-Knox forms were on the job, and practically all of these were strung out in front of the paver at the start of the day's work. They were tamped in place by a Cleveland form tamper, and the pins were driven by hand. Excess material from the paving section was removed by a Ben Flynn subgrader, and a final check taken on the grade with a scratch template.

As the paver worked outside the forms on the full 24-foot paving, the transverse joints were installed as soon as the grade was checked. Dummy contraction joints are on 30-foot spacing, with an expansion joint every 420 feet on the tangents. The Texas Foundry of Lufkin, Texas, furnished the assembly and hardware for both types of transverse joints.



C. & E. M. Photo

Here's the finisher lineup on the James & Co. job, as seen from the top of the paver.

Both types of joints have 18 star lugs across the 24-foot slab for load-transmission assemblies. At the contraction joints these star lugs are held by two wooden strips, each nearly 12 feet long x 2 inches in depth at the center and 4 inches at the sides. At the expansion joints, a strip of redwood, ¾ inch thick, extends up to within ½ inch of the top of slab. Four pins held the wood expansion joint in position until after the concrete was placed around it, then they were pulled.

Finishing Operations

Batches were mixed for 1½ minutes in a Koehring 34-E Twinbatch paver equipped with a 35-foot boom, then deposited between the oiled forms in front of a Jaeger-Lakewood dual-screed finishing machine. From the rear of this finisher, a man embedded tie rods into the concrete along the longitudinal center line of the slab. Supplied by LaClede Steel Co. of St.

(Concluded on next page)

introducing

the Coffing COIL CHAIN SAFETY-PULL RATCHET LEVER HOIST

The Model R is now available in 1,500- and 3,000-lb. capacities — other sizes will follow.

Advanced Guard for a New, Advanced Line

Here is a completely new ratchet lever hoist designed to bring you added safety and convenience. The Model R incorporates the time-proved ratchet and pawl principle originated by Coffing — makes it hold positively at all times — no friction-type brake to slip or freeze — chain is free wheeling when not under load.

Many New Advantages

COIL CHAIN Swings or wraps in any direction for greater flexibility in use.

SIX OPERATING POSITIONS Handle operates in any position, works on full or partial strokes — for ease of handling in close quarters. Safety stops prevent spinning of handle.

SAFETY FACTOR OF FIVE All hoist load-holding parts designed to withstand pull equal to five times rated capacity. Each hoist also factory tested at 100 percent overload. "Safety-valve" handle bends at point of maximum safe overload.

SIMPLE TO SERVICE The Model R may be completely disassembled with only a screwdriver for easy servicing. Not necessary to return it to the factory for repairs.

Find out more about the hoist that gives you greater convenience and safety in all lifting, pulling, stretching. Write for Bulletin C10R

COFFING HOIST COMPANY
Danville, Illinois

Quik-Lift Electric Hoists • Hoist-Alls • Load Binders
Mighty-Midget Pullers • Spur-Geared Hoists
Differential Chain Hoists • I-Beam Trolleys

Sold by Industrial Distributors everywhere

THIS IS THE WAY TO USE PRIME-MOVER IN YOUR OPERATIONS

This Prime-Mover is hauling concrete 1500 lbs. a trip for addition to plant at Grain Processing Company. One unit does as much as three men with barrows.

Helps in many ways to speed completion!

ON BIG jobs or small, the man power savings are important on these operations: moving equipment and tools; hauling concrete and aggregates; carrying materials and fixtures; handling plaster, roofing materials and for clean-up. Hundreds of contractors using fleets of Prime-Movers have paid for their machines on one job alone.

Quick change (2 minutes) from bucket to platform greatly increases the Prime-Mover's usefulness.

Dependable 5 h.p. Wisconsin engine. Reverses under power.

Capacity of 1500 lbs. on platform or in bucket (10 cubic feet liquid.) For name of distributor and additional data, write to us.

THE PRIME-MOVER CO., Muscatine, Iowa

THE Bell PRIME-MOVER

the BEAVER model-A is ALWAYS NEWS!

Performance is what counts in a pipe machine . . . and, successful performance is always news . . . year after year.

Beaver Model-A Pipe and Bolt machine gives you quick, clean threads, precision cutting and reaming. It is right handed with all controls in front. You get 50% greater working space, gear driven power in abundance, and a full range from ⅛ to 2 inches.

Reversible Universal motor, safety "shear pin," rack and pinion feed, self-centering wheel and roller cut-off, heavy duty chuck, adjustable opening die heads, interchangeable die segments and an easily accessible oil pump . . . all add up to top performance.

For more information on successful pipe tool operation . . . write for catalog on the BEAVER line today.

BEAVER PIPE TOOLS

158-300 DANA AVE., WARREN, OHIO, U.S.A.

Louis, Mo., the rods are ½ x 36-inch and are spaced on 30-inch centers. Following behind was a single bridge from which steel strips were inserted into the concrete at the transverse contraction joints. The strips are ¼ inch wide x 1½ inches deep, and came in two sections to make up the 24-foot width.

Next in line was a double bridge with a wheel at the front end for cutting a slot along the longitudinal center line. Steel strips, also ¼ by 1½-inch, were pushed into the slot from this unit. After that a Koehring Longitudinal Finisher moved ahead over the concrete surface which was then checked for irregularities with 10-foot straightedges. A 12-inch canvas belt attached to a light metal frame equipped with plow handles was pulled over the surface leaving a faint herringbone pattern in the concrete.

By this time the mix was setting up slightly, and the finishers pulled the steel strips from the transverse and longitudinal joints, giving them an edging with a ⅛-inch-radius tool. In back of this operation came another bridge from which a black center-line marker was worked into the concrete. This black strip is composed of iron oxide, 6 inches wide x ⅛ inch thick. The last machine in the finishing lineup was a Heltzel Flex-Plane rig from which Richcure curing compound was applied to the surface of the concrete. Average production ranged from 1,200 to 1,500 linear feet of 9-7-9-inch pavement, 24 feet wide, in a 10-hour day, depending upon the cement supply available.

Joints were poured, the day following the paving, with Tee Juana asphalt. This was handled by the same crew that pulled forms, moved them ahead, and set them for the next stretch of pavement.

The Mix

The design mix for the paving was in the proportions 1:1.92:3.08, and the weights for a typical 8-bag batch were as follows:

Cement	752 lbs.
Sand	1,718 lbs.
Gravel, 1½-¾ inch	2,489 lbs.
Water, 40 gals.	332 lbs.
	5,291 lbs.

Quantities and Personnel

The major items in the 3-mile paving relocation contract included the following:

Clearing	19 acres
Common excavation	27,516 cu. yds.
Special borrow excavation	233,690 cu. yds.
Concrete pavement, 9-7-9-inch	44,335 sq. yds.
Poured filler asphalt material	11 tons
Tie-bar assembly	17,067 lin. ft.
Star-lug assemblies, contraction joints	12,960 lin. ft.
Star-lug assemblies, expansion joints	1,000 lin. ft.

T. L. James & Co., Inc., employed a force averaging 100 men on the project under the direction of Jimmy Perritt, Superintendent. L. H. Hadnot is District Engineer for the contractor for the area in which the job was located.

For the Louisiana Department of Highways, J. A. Brown was Project Engineer, assisted by Dempsey D. White. The Department is headed by R. B. Richardson, Director, with N. E. Lant, Chief Engineer. E. J. James is Construction Engineer, and C. J. Helbak, District Construction Engineer.

Vulcan Tools

Rock Drills, Pavement Breakers and Clay Diggers.

Vulcan Tool Manufacturing Co.

35-42 Liberty Street, Quincy 69, Mass.

Branch Offices and Warehouse Stock.

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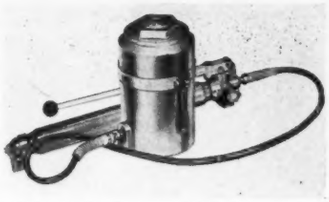
Send for catalog or see your local distributor.



This is the Bee-Line 100-ton remote-control jack for heavy construction.

A New 100-Ton Jack

A heavy-duty sander for use on designed for heavy-duty automotive and construction work has been introduced by Bee-Line Co., P. O. Box 569, Davenport, Iowa. The unit is of compact design and features collapsible twin handles for easy positioning. The remote-control feature makes it easy to use where working space is limited. The Bee-Line jack has an 8-inch diameter base, a 13⅜-inch collapsed height, and a 19⅛-inch extended height.

Further information on the Bee-Line jack may be secured from the company. Or use the Request Card at page 16. Circle No. 710.

Heavy-Duty Sander

A heavy-duty sander for use on metal and enameled metal surfaces has been developed by The Porter-Cable Machine Co., 1714 N. Salina St., Syracuse 8, N. Y. The compact Model 106 weighs 6 pounds. It is 9½ inches long, 4⅛ inches wide, and 6½ inches high. A heavy-duty Universal motor powers it. The handle is designed to fit the hand for a firm grip, and the conveniently located trigger switch is safe and easy to operate, the company says.

The Guild sander uses one-third of a standard 9 x 11-inch sheet of sandpaper which is drawn into place and secured with a patented paper clamp. The large air intake, located high on the machine, draws in enough air to keep the motor cool. The abrasive pad revolves in a ¼-inch-diameter orbit at 4,000 rpm.

Porter-Cable's Model 106 Guildsander weighs 6 pounds and is 9½ x 4⅛ x 6½ inches in size.

Because of this orbital motion, the machine can sand with, against, and across the grain without scratching or marring. This blending action is said to be particularly effective wherever cross-grains meet—at butt, miter, and glued joints.

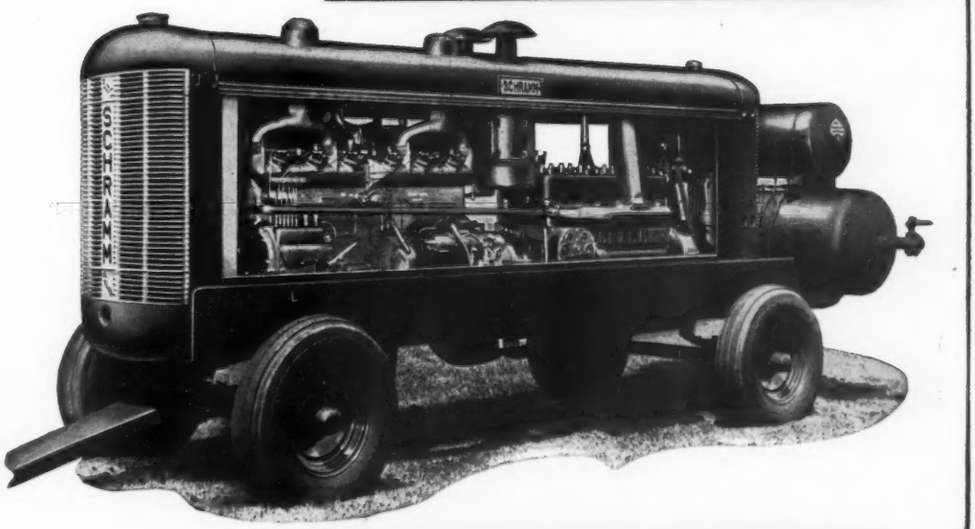
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 730.

SCHRAMM

MODEL 600

Diesel Engine Driven

Air Compressor



Fuel Savings Up To 50%

Pneumastat, simple and rugged . . . Proper Speeds . . . Less horsepower required . . . Cam operated mechanical intake valves, greater volumetric efficiency. There you have some of the many features in the new Schramm Model 600 Air Compressor . . . features that mean economy while supplying you with 600 cubic feet actual air delivery.

SIMPLIFIED DESIGN

You will like its streamlined, simplified design, too—fewer parts . . . watercooled enabling operation with doors closed . . . Dual fan belts . . . Engine and compressor speeds designed to operate at maximum Diesel Engine efficiency.

Don't delay. Write today for Bulletin 5025 on this great, new Model 600 Schramm Air Compressor.

SCHRAMM INC.

The Compressor People

WEST CHESTER • PENNSYLVANIA

These catchy "Boss Sez" posters were popular attention-getters on the Argonne project and helped sell safety to the 1,500 men on the job. Notice that it's the cartoon workman himself who gives the warning, quoting the boss. Austin developed the posters and spotted them liberally in all working areas.

Photos Courtesy of The Austin Co.

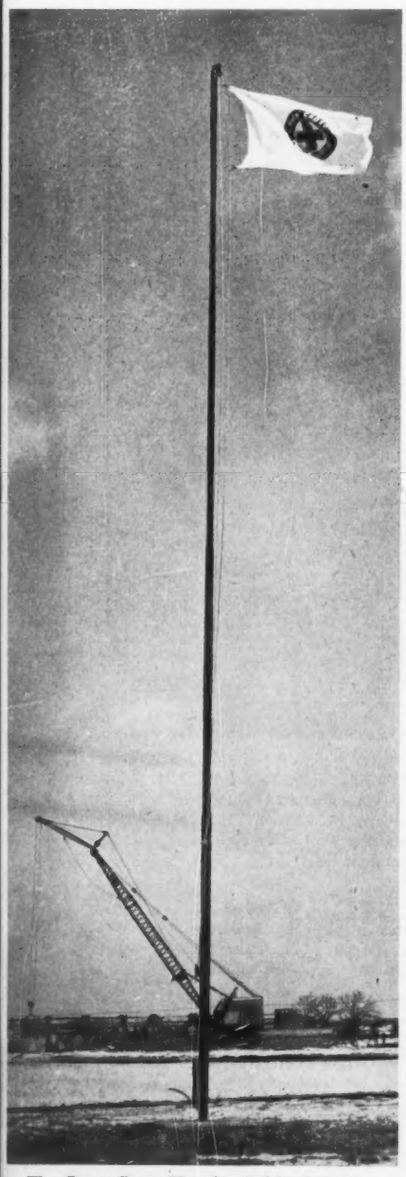
Safety Sold to Men On Project for AEC

Program Spearheaded by Management Earns the Austin Co. A Safety Award on Argonne Lab Construction

By A. L. FRITZ, Project Safety Engineer, The Austin Co.

• *"IT is the duty of every man to protect himself and those associated with him from accidents which may result in injury or death."* Abraham Lincoln made this observation nearly 100 years ago. The knowledge that he concerned himself with safety gave immeasurable impetus to construction performance at the Argonne National Laboratory.

Quoted on the inside cover of a booklet handed to all construction personnel as they reported for work on the multimillon-dollar Atomic Energy Commission project, Lincoln's simple premise was taken to heart by the more than 3,000 men directly responsible for one of the major construction safety achievements of 1950. The record which they made on the AEC's 3,600-acre Argonne site, 26 miles southwest of Chicago, serves to illustrate the basic relationship between planning and results in any program for safety in the field.



The Green Cross Flag for Safety flew as long as there were no lost-time accidents.

Alongside the Green Cross Flag was this display board with a safety slogan on the top and a kind of safety barometer on the bottom. The slogan was changed regularly.

Argonne's Safety Significance

This record won for the builders in charge of construction—The Austin Co. —a special plaque for meritorious achievement from the Atomic Energy Commission. Encompassing one 12-month period, it included: (1) 153 consecutive working days without a single lost-time accident—a period covering 1,180,000 accident-free man-hours by an average of 1,500 employees; (2) 14 lost-time accidents out of a total of 2,712,000 man-hours worked; and (3) an accident-frequency rate of 5.09.

Three years of construction work on this project have been completed without a fatality!

What was the secret? How did Austin tackle the safety job at Argonne? The answers may be found in the way the company approaches any problem concerning its design, engineering, and construction service. The formula used

(Continued on next page)

The safety department, including a safety engineer, project doctor, and registered nurse, was backed up by a safety committee of top executives and by follow-through safety coordinators.

—if it may be called that—consisted simply of "planning the work and working the plan" safety-wise. Developed expressly for the specific job at hand, the safety program represented the lessons learned by the Austin organization in more than 40 years' experience in engineering safety into construction work.

Planning and Organization

Sound planning and good organization were the first requisites. Even before actual construction started back in 1948, a special department had been organized and staffed specifically for this project. It was fully primed for action the day the first layout stake was driven. Basically, the organization provided a safety engineer, project doctor, registered nurse, clerk, and assistant engineers as needed in terms of the number of employees.

The safety engineer reported to the project manager and directed the work of all departmental employees. His duties, among others, comprised constant inspection of all work in progress at least once a day, or more often whenever possible; maintenance of the first-aid station and its facilities; and immediate investigation of all serious accidents, whether or not they involved lost time.

Backing up this basic organization was a supplementary group—a second line of safety defense. It was a top-executive safety committee composed of five key men: the project manager, general superintendent, safety engineer, and two representatives from the safety department of the controlling contractor, The University of Chicago. The committee provided ideas and suggestions for safety improvement and betterment.

Then, to follow through with workers on the spot, special safety co-ordinators were named to serve each of more than a dozen different buildings under construction and other areas of activity. These men included clerks, labor foremen, and assistant superintendent, all of whom thus functioned as liaison officers for safety.

On most projects, Austin looks to its superintendent for safety in construction just as surely as it does for speed, economy, and quality of performance. As the company's general manager on the site, he ordinarily organizes the job for safety, lines up the construction equipment, plots the work schedule, determines the construction procedure, and so on. In his decisions, the basic importance of safety in the over-all picture is always a key consideration.

In this instance, however, due to the scope of the project, number of buildings involved, site size, and other factors, it was recognized at the very outset that each area superintendent already had more than enough duties without tackling those of the safety program. To solve the problem, co-ordinators were given safety duties in addition to their regular job assignments of field clerks, engineers, general foremen, and assistant superintendents—plus the authority to enforce established accident-prevention measures.

Photo Courtesy of The Austin Co.

An accident-frequency rate of 5.09 and three years of construction without a fatality were part of the record that won Austin its award from the AEC. Here AEC Engineering Division Director Casey (front, right) presents the trophy to Austin Project Manager Engstrom. Left to right around them are Chief Engineer Weidner, University of Chicago Safety Coordinator Klett, Safety Engineer Fritz, Deputy Chief Engineer Carlson, General Superintendent Slattery, and AEC Safety Chief Aronstom.

So much for a quick look at the safety organization itself. Now, how was its program—safety—sold? In a variety of ways.

Rallies Held Regularly

First, meetings of the committee, and of the entire construction crew, focused

(Continued on next page)

USE RIGHT BUCKET FOR THE JOB

Hayward makes all three — clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.

Trade HAYCO Mark

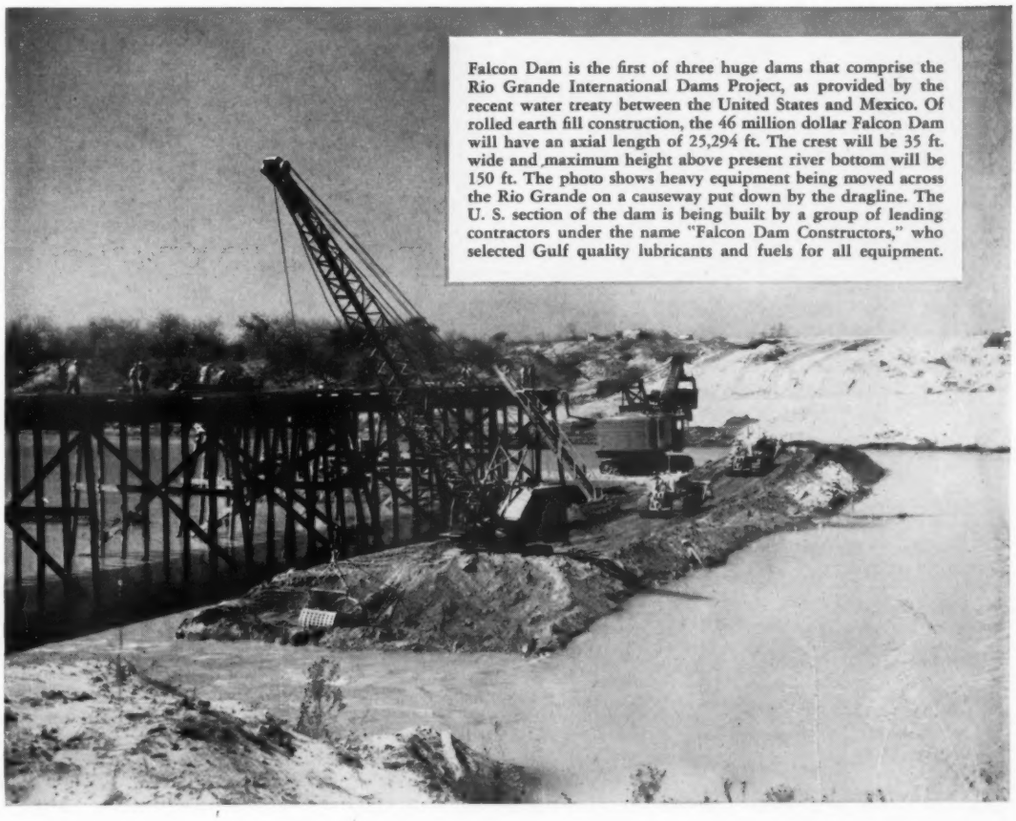
THE HAYWARD CO.,
32-36 Dey St., New York

Hayward Buckets

GULF PRODUCTS *and* **FINE SERVICE**

keep equipment rolling

on Falcon Dam Project



Falcon Dam is the first of three huge dams that comprise the Rio Grande International Dams Project, as provided by the recent water treaty between the United States and Mexico. Of rolled earth fill construction, the 46 million dollar Falcon Dam will have an axial length of 25,294 ft. The crest will be 35 ft. wide and maximum height above present river bottom will be 150 ft. The photo shows heavy equipment being moved across the Rio Grande on a causeway put down by the dragline. The U. S. section of the dam is being built by a group of leading contractors under the name "Falcon Dam Constructors," who selected Gulf quality lubricants and fuels for all equipment.

THE Falcon Dam is a big construction project. It's the kind of job on which the contractors are not likely to take chances with their equipment. They want sure protection and efficient power to insure top performance and prevent costly mechanical delays.

That is why Falcon Dam Constructors selected Gulf quality lubricants and fuels—on the basis of experience and reputation. And they are getting the kind of lubrication and fuel performance that is required to complete the job on schedule.

Let us discuss with you how Gulf products and services can help you on your next job. They are available to you through more than 1200 conveniently located warehouses. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

Safety Sold to Men On Project for AEC

(Continued from preceding page)

attention on safety and infused workers with the safety spirit. The top-level committee convened once a month to develop a positive program, implement it as the occasion demanded, and analyze problems as they cropped up. Then, regularly scheduled meetings were held for workers in selected individual groups, with their foremen, area superintendents, and supervisory project personnel. Such sessions forged and tempered the strong tie of cooperation and mutual interest which is basic to any accident-prevention effort. Frank discussion of accident experience and working conditions held the front seat at these informal gatherings. Faults and mistakes were examined in detail, good words given for good performance records.

Other group meetings, regularly scheduled, featured interesting talks on safety, some of them by speakers from the National Safety Council. At these sessions, new employees received special attention. The company's safety rules were explained right along with the duties of the job itself. Those new to construction work were oriented right at the start in the safety tricks of the trade—all the things you have to watch for on a building project.

Safety-mindedness was not stirred up and maintained simply through these meetings, however. Effectively supplementing them were a number of merchandising aids calculated to hammer home the basic concept of accident prevention all along the line—to sell safety directly to each and every man on his individual job.

Display Boards Spotlight Safety

Two of these aids were two billboard-type display boards, each 10 feet high and 12 feet wide, set up where workers coming to and going from the job would be sure to see them. Mounted on these boards were jumbo-size multi-colored posters secured from the National Safety Council. These were changed at least once a month to stimulate maximum attention and interest.

Instant impact also was secured by another display board, 8 feet high and 10 feet wide, which was divided into two parts. The upper half featured a safety slogan, which was changed periodically—*Any job is a safe job . . . For a careful workman . . . Do your good turn daily . . . Work safely.* The bottom half of the board, functioning as a safety barometer, tabulated how many days the job had operated without a lost-time accident.

Adjacent to this sign was a flagpole from which the Green Cross for Safety Flag flew as long as there were no lost-time accidents. When one occurred the flag was taken down until the end of the current month, then raised again.

Other smaller posters and signs, supplied to all Austin jobs regularly by the home office in Cleveland, were liberally used. They were spotted in all working areas where the men would see them frequently. These constant safety reminders, developed by Austin, were printed in two colors on 8½ x 11-inch cardboard.

"The Boss Sez" Attention-Getter

One series which aroused considerable interest featured a construction worker drawn in a caricature style. He carried through on a number of signs covering different types of accidents or safety measures. The safety message in each case appeared as a quotation "The Boss Sez" from the worker himself. Here are a few examples:

Under the caption of "Bend Em", one shows a worker hammering over some nails sticking through a plank, commenting that "The Boss Sez: Bend all nails over or pull them out . . . keep yard clean and wear thick-soled shoes."

Headlined "Honk", another card shows a tractor operator looking backward, cautioning, "The Boss Sez: Give good warning, then proceed slowly and

(Continued on next page)

Premolded Para-Plastic

AVAILABLE IN 3 TYPES

- **PARALATERAL—wide strip for vertical joints**
- **NARROW STRIP—Pressure Seal**
- **MOLDED STRIP—for keyed construction joints**

Premolded Para-Plastic in any of its forms has a high degree of cohesive, adhesive, resilient and plastic properties that assures maximum effectiveness in any type of seal. Bond is maintained at all temperatures from 0° to 180°—regardless of moisture conditions. Economical—easy to handle—fast application—Premolded Para-Plastic is answering joint sealing problems in every type of construction.

Write for illustrated Bulletins and complete details.

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6051 W. 65th ST., CHICAGO 38, ILL.

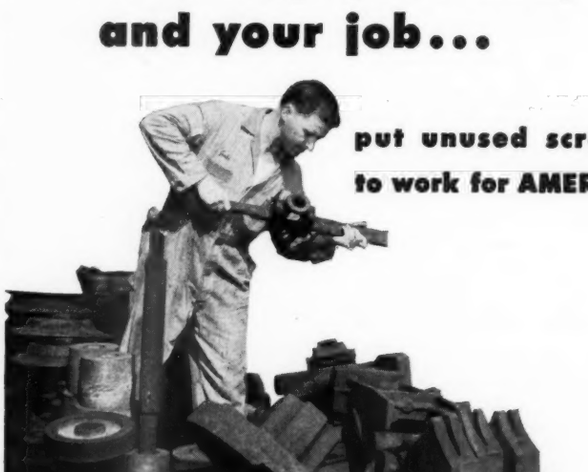
The list of roads, airports and bridges constructed with the help of FLEX-PLANE equipment reads like a report of the nation's top construction projects. And why not — FLEX-PLANE equipment is

the modern way.. Flex-Plane

engineered to modern times. Highways, bridges and airports are larger, stronger and must be constructed faster than ever before. FLEX-PLANE has always been a leader in designing and building automatic machinery that enabled construction people to build better at greater speeds.

It was FLEX-PLANE who developed the dummy joint and built the world's largest finishing machine. It was FLEX-PLANE who pioneered automatic curing and automatic dowel bar installing, and built the machines to do the job. And it is FLEX-PLANE today with the most up-to-the-minute equipment for all kinds of heavy concrete work. Be sure you have the latest. Write ***The Flexible Road Joint Machine Co., Warren, Ohio,*** for the last word in modern cost-reducing concrete equipment.

Clean up your shop and your job...



put unused scrap to work for AMERICA!

Don't let metal scrap lie idle. It's vital to keep America's production at peak level. Steel producers need 37,000,000 tons of scrap a year to serve you and America. Remember: today's scrap is tomorrow's production of steel for the American Way. It can also make the tanks, guns, and shells to protect our future security. In the shop . . . or out in the field . . . clean up after *every* job — and *"Get in the Scrap!"*

LACLEDE
Producers of Steel for Industry and Construction

LACLEDE STEEL COMPANY
St. Louis, Mo.

watch out for obstacles, when moving machines."

A third illustrates what the well-dressed construction worker wears—a hard hat for protection against falling objects; goggles to protect eyes against flying chips, fumes, and arc flashes; clothes of proper type and fit to prevent serious falls or catching in machinery; gloves to safeguard against cuts, splinters, and abrasions; and hard shoes for protection against falling objects, nails, and crushing. The message—"The Boss Sez: For your own benefit, dress and work safely. Your job is only as safe as you make it."

Other Communications Used

Special letters from Austin's home office also spread the gospel of safety. Copies were distributed to all supervisory personnel. Each letter—never longer than a page—was devoted to a specific subject and given a catchy treatment to arouse curiosity and tempt even the busiest supervisor or foreman to stop, look, and read.

As a sample: "Those Feet Again", with a few digs on keeping the men's feet off nails. "More Powwows", pointing up the importance of meetings chock-full of interesting safety material. "Those Hands of Yours", stressing hand care through careful, wise use. "Good Housekeeping", with some encouragement to a superintendent to do as well on the job as the little lady does at home. No attempt was made to be technical or go into detail. Instead, the main purpose of each letter was simply to spark live interest in one particular aspect of safety.

Notable, too, is the positive rather than the negative approach to safety used in all the signs and letters. Austin's experience indicates that you get a better response to "Do This" than to "Don't Do This". Likewise, it stays away from gory illustrated signs, with blood dripping from a wound, or a man falling from a ladder. It's tragic enough when such accidents happen, so why illustrate the possibility at all times?

The "Employee's Handbook of Safety Rules" was another effective safety tool used. A pocket-size illustrated 40-page manual, it was developed by the top-executive safety committee specifically for use at Argonne.

Special Safety Handbook Prepared

The manual is a comprehensive yet concise compendium of safety suggestions covering 12 different trades. Altogether it contains 305 items, which are segregated in sections for each trade. These are four main parts: general project safety rules; safety rules for individual trades; safety rules for office workers; and information for foremen.

Designed for and distributed to all project personnel, the manual presents an easy-to-read digest of regulations, together with many other special rules of safe construction practice originating from Austin's experience in safety engineering.

Another form of communication was a short and snappy typewritten "safety-gram" attached weekly to every worker's pay check. This technique, a leaf torn from Austin's book of experience on industrial safety, proved quite successful at Argonne, too.

Importance of Records

Records kept as work progressed provided a clear up-to-the-minute picture of the entire project from the safety viewpoint. Individual accident reports were made out on every worker treated, no matter how minor the mishap. Individual cards charted the medical treatment of the workers affected. The safety engineer kept a large chart classifying all injuries according to type, working area, and labor classification.

Such records spotlighted conditions which, had they not been discovered promptly, could have jeopardized construction safety in one way or another. Eternal vigilance, the watchword of safety, was simplified to a great extent by constantly reviewing these records.

Beyond all these tested techniques and merchandising methods employed to tell and sell the safety story, special attention was paid to known inherent hazards in construction work. Among these, to name merely a handful, were construction of a large boilerhouse, several miles of 15 to 25-foot trench, power electrical supply line throughout the project, and many high scaffolding jobs. By following regulations and standard working conditions established by AEC and Austin for such hazardous types of work, many serious accidents were prevented. Special safety co-ordinators were Johnnies on the spot—ever alert, constantly on watch for any violation of regulations.

Finally, through special cooperation of the guard force, weekly reports to the safety department listed all dangerous areas and safety violations noticed by guards. This checkup aided the entire safety program in many ways.

Success Based on Many Factors

The exceptional safety performance on the Argonne project may be attributed to a combination of factors. Efficient planning and organization were vital in getting the program started on the right foot. Another factor was the AEC's extreme safety-consciousness which, matched by that of

(*Concluded on next page*)

GET slow machines there FASTER

on a fast loading
MILLER Tilt-Top

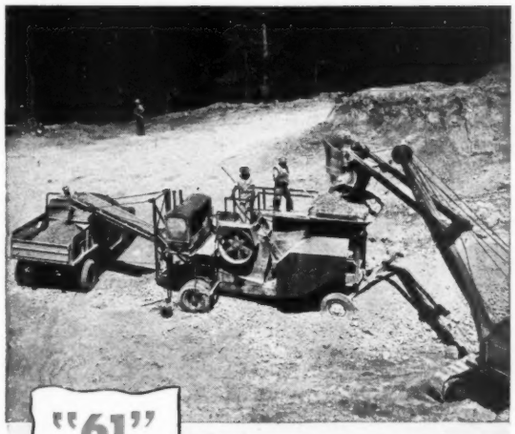
There's no lost motion with a MILLER. Self-powered equipment walks right onto the tilted platform—practically loading itself. Hauling becomes a ONE man job, saving valuable man hours as well as cutting non-productive time for slow moving machines. Although low in cost MILLER Tilt-Tops are carefully engineered and ruggedly built. Standard platform is 14' x 8', optional 16' available. Platform, tires, Timken bearings, pintle eye and dual Budd wheels are all standard equipment.

MODEL "B" 10 TON $1175

The following equipment is optional and extra: Hydraulic tilt control, two speed winch, electric brakes. IMMEDIATE DELIVERY.

MILLER RESEARCH ENGINEERS DEPT. C-10, 729 W. BURNHAM ST. MILWAUKEE 4, WIS.

MAKING LITTLE ONES OUT OF BIG ONES



"61"

Designed for fast, economical production where extreme accuracy in grading to size is not required. Compact, lightweight and readily portable. Simple design and sturdy construction keep operating and maintenance costs at a minimum.

The AUSTIN-WESTERN LINE includes Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors and bins. Exclusive features increase output, assure constant operation and reduce maintenance costs. Skilled engineering characterizes each and every Austin-Western crushing, screening and washing plant, which is tailor-made to a particular production problem. We would welcome the opportunity to discuss yours.

AUSTIN-WESTERN COMPANY
Aurora, Illinois, U.S.A.
Subsidiary of Baldwin-Lima-Hamilton Corporation

"201"

You'll like its READY PORTABILITY . . . CHOICE OF FEED . . . HIGH OUTPUT. The "201" is of a size and weight that can be transported over most highways without a special permit . . . may be had with either shovel-loading hopper, or swivel drive for separate feed conveyor . . . is capable of producing especially large amounts of ¾" and smaller product.

BUILDERS OF ROAD MACHINERY SINCE 1859
Austin BALDWIN BLH LIMA-HAMILTON **Western**

Safety Sold to Men On Project for AEC

(*Continued from preceding page*)

The University of Chicago and Austin executives, insured the sustained interest and direction from top management that is required for successful accident prevention.

Still another basic force which kept the safety campaign perking was the splendid way safety co-ordinators handled a myriad of details on the construction scene. They were ever on the lookout for the least deviation from safe construction practices.

Perhaps the biggest single element in this successful safety program, however, was the wholehearted cooperation and interest of the workers themselves. Every man became acutely conscious of the safety duty imposed by his job —"the duty to protect himself and those associated with him from accidents which may result in injury or death." He came to recognize that in the final analysis "A careful workman is the best known safety device."

Tips on Truck Maintenance

A booklet called "GMC's Tips to Truckers in the Emergency" is available from GMC Truck & Coach Division, General Motors Corp., 660 South Blvd., E. Pontiac 11, Mich. Its advice on truck maintenance is designed to help prevent breakdowns and costly delays.

"Neglect of vital operating parts, which wear out gradually, eventually causes failure", the booklet states. GMC engineers recommend that a truck undergoing severe service be inspected every 1,000 to 5,000 miles, depending on the type of service; they recommend inspection every 30 days on low-mileage units. The booklet's detailed checklist for preventive maintenance recommends that the chassis be lubricated, and many points examined for wear, looseness, or misalignment.

A sample section asks what "clutch-pedal free travel" means. It then points out that insufficient free travel will burn up a clutch, while too much free travel will not permit a complete disengagement and will result in clashing gears. "For these reasons a periodic check of the clutch will save costly replacements", it says. Other sections cover generators, chassis, wheels, crankcases, fuel pumps, and carburetors. There are handy checklists at the end of the booklet.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 772.

Batteries and Treatment

A simple economical way to combat battery sulfation is covered in a catalog prepared by Pioneers, Inc., 2411 Grove St., Oakland 12, Calif. An outline of the company's history introduces the reader to the Battery AD-X2 service system. Batteries treated under this system go through a standard process and are returned to the owner with a one-year nonprorated guarantee.

The mechanically sound parts are selected and reassembled with new separators into new or re-usable battery cases. Then they are treated with Battery AD-X2, charged, painted with an acid-repellent paint, and are ready for use. Action photographs show all steps in the process. Testimonials of users, some of them in the construction industry, appear in the center fold of the bulletin.

Battery AD-X2 is also used to treat new mechanically sound batteries, 6 months old or less if in composition cases, or 1 year old or less if in rubber cases. This treatment is reputed to double the life expectancy of lead-acid batteries.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 786.

A New Concrete Cart

A dump-type concrete cart with a 9-cubic-foot water-level capacity is announced by Sterling Wheelbarrow Co., 7036 N. Walker St., Milwaukee 14, Wis. The E-Z Dump pivots at the nose and is said to be perfectly balanced and easy to handle. The operator pushes the tray forward to let concrete pour out. The undercarriage construction enables the wheels to remain on the wheeling surface while cart contents are discharged. This means less deadweight lift, Sterling says.

The tray is made of 12-gage steel, reinforced on the top edge. A specially constructed axle, 1⅜ inches in diameter, is hinged to the bottom of the tray. Handles are 1-inch heavy pipe. The 10-spoke wheels have a 6-inch hub and 5.00 x 21 pneumatic tires. Roller bearings are Timken.

Further information on the E-Z Dump may be secured from the company. Or use the Repuest Card at page 16. Circle No. 778.

The E-Z Dump concrete cart, made by Sterling Wheelbarrow Co., has a 9-cubic-foot water-level capacity.

STEEL SHEET PILING

BELVAL Z perfect range of corrugated sections most economical section modulI

AMERLUX STEEL PRODUCTS CO. NEW YORK 17, N. Y.

Direct Mill Office of the ARBED STEEL MILLS IN LUXEMBOURG

BELVAL P straight web section best defined hooking

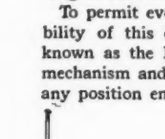
for DRILLING POWER and UNLIMITED VERSATILITY

you can't beat this New

FM-3 WAGON DRILL

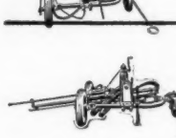
Most construction and mining men are familiar with the famous X-71 WD Rock Drill. Its drilling speed and hole cleaning ability on deep holes are recognized wherever Wagon Drills are used. It is the only drill made especially for Wagon Drill service.

To permit even further utilization of the power and reliability of this drill, we introduce a brand new mounting known as the FM-3. It incorporates a new type of lifting mechanism and a rugged yoke that permits easy drilling in any position encountered in modern rock excavation.

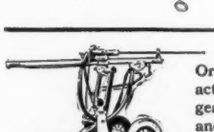


Notice how the swivel wheels are turned and how the drill extends beyond wheels for line hole work against a face.

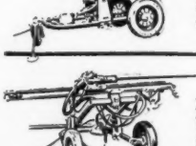
And how low the yoke can be lowered for efficient toe hole drilling.



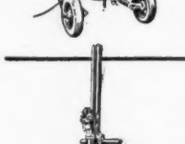
Or how, by a handy crank actuating a powerful worm gear arrangement, the yoke and drill can be easily raised to highest drilling position.



Here's an exceptionally stable and easily moved set up for drilling hole after hole along a face.



What could be more convenient for line hole work? It takes but a minute to swing the swivel mounted wheels through a 90 degree angle.



And for steeper angle drilling, here's another easy set up. All controls are at the operator's fingertips.

Remember Ingersoll-Rand Drills are sold and serviced by men who know rock drilling. Take advantage of this highly trained and skilled service. There is an Ingersoll-Rand branch office and distributor near you. Write or call today.

CARSET JACKBIT

Ad 596-5

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

Mall makes this lightweight gasoline-powered earth auger, which converts to a chain saw.

Combination Auger And Chain-Saw Unit

A lightweight, portable, gasoline-powered earth auger has been designed by Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill. Made with new magnesium-alloy castings, it can be used in any terrain for drilling holes for retaining-wall supports, guardrail posts, fence posts, and temporary power and communication-line poles. The new unit is equipped with 30-inch augers in 6, 9, or 12-inch diameters.

It is a dual-purpose machine which can also be converted to a chain saw. The digging attachment can be removed and replaced with chain-saw assemblies with cutting capacities of 18 to 84 inches. The company points out that with the one engine and two attachments, post and pole timber can be felled, cut to size, and placed in the ground.

Further information can be secured from the company. Or use the Request Card at page 16. Circle No. 733.

Catalog on Power Units

A 24-page bulletin on heavy-duty engines and power units is available from Minneapolis-Moline Co., Minneapolis 1, Minn. It covers many 4, 6, and 12-cylinder engines for use in the construction industry.

Cutaway photographs indicate interior features designed to give high performance and long life. On-the-job photos illustrate field service applications. The bulletin points out that Minneapolis-Moline units are factory-equipped with fuel bundles and completely engineered to burn gasoline. distillate, natural gas, or LP gas. It covers additional equipment such as hoist control, steel skids, fan guard, starter-generator, etc.

This literature may be obtained from the company by requesting Bulletin 1026, or by using the Request Card at page 16. Circle No. 744.

Hydraulic Riveter

The Guillotine Riveteer, a new unit for driving rivets with hydraulic pressure, has been developed by Manco Mfg. Co., Bradley, Ill. It delivers 60,000 pounds of thrust through its hydraulic ram and will drive 5/8-inch cold rivets. It is portable, easy to operate, and the entire riveting cycle takes about 2½ seconds, the manufacturer claims. The operator presses the hand valve to actuate the ram; he releases it to retract the ram.

The company reports that by using hydraulic pressure, full thrust is delivered over the entire stroke and no adjustment is needed for rivets of different lengths. The unit is said to be relatively quiet in operation. Specially designed oil seals prevent leakage both at maximum pressure and at no pressure. The unit is obtainable without the C-frame for those who want to design their own frame. A variety of portable pump units, both electric and compressed-air, are available for actuating the hydraulic pressure. Adaptations of the basic Guillotine, of which the Riveteer is a development, are also available for cutting steel bars, wire rope, and electric cable.

The Manco Guillotine Riveteer delivers 60,000 pounds of thrust through its hydraulic ram.

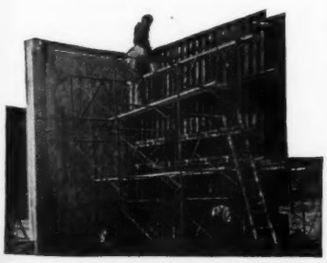
Further information may be obtained from the company. Or use the Request Card at page 16. Circle No. 756.

Atlas

SPEED SYSTEM of All Steel Form Construction

Not just a set of forms but a complete system including layouts, cost analysis, pouring schedules, Atlas SPEED forms and specialists to train your men. You SAVE and SAVE—Forms go up fast and are reused on all types of jobs without adjustments or repairs. Many report 500 and more uses. Let's talk it over. Write Dept. ME for a representative to call.

IRVINGTON FORM & TANK CORP.
20 Vesey Street, N.Y., N.Y.



THERE'S AN INSLEY WORKING NEAR YOU

Project rated

. . . by the user
. . . to do his job best

Distributor Doings

"End-Project Contractors Need Help", Says Beal Shaw

Unless something is done to make construction equipment more readily available to contractors not working directly on defense projects, it is possible that the defense effort may be impaired. That fear was advanced by Beal Shaw, Regional Director of Associated Equipment Distributors Region 11 and President of Shaw Sales & Service Co. of Los Angeles, Riverside, and San Diego.

"Our smaller contractors on 'end projects' not directly related to national defense are now in a bad squeeze to get the equipment they need", Shaw explained. "Very few crawlers tractors, power shovels, or other heavy equipment comes in now without a DO priority. Still, the work these contractors are doing is vital to national economy and well-being, and in that respect to the defense effort".

The problem will be high on the AED four-region meeting agenda October 10-13 as delegates from Regions 11, 12, 14, and 15 meet in Sun Valley, Idaho, Shaw believes. The Idaho meeting, first such multi-regional AED gathering in the west, will draw national AED officers. L. E. Jones, Butte, Mont., Director of Region 12, is General Chairman. A. F. Sersanous of Portland, Oreg., is Program Chairman. Frank Skidmore of Albuquerque, N. Mex., heads the Region 14 delegation, and S. A. Stephens of Montreal, P. Q., Canada, Region 15.

L. J. Hammond, center, President and Treasurer of Hodge & Hammond, Inc., signs a sales and service agreement as LeTourneau's Eastern Sales Manager H. R. Fewers, left, and Hodge & Hammond Vice President G. W. Lochner look on. Comptroller William Rothstein stands behind them.

Names Hodge & Hammond, in N. Y.

Hodge & Hammond, Inc., 720 Garrison Ave., New York, is now a LeTourneau distributor in parts of New York State and New Jersey. It covers counties south and east of, and including, Dutchess, Ulster, and Sullivan in New York—also Manhattan, Long Island. and Staten Island. In Jersey its territory runs north of and includes Hunterdon, Somerset, Middlesex, and Monmouth counties.

Organized in 1933, the firm now occupies a 2-story office-showroom building and a one-story parts and shop building completed last January. In addition to LeTourneau its major accounts are Northwest Engineering Co., Worthington Pump & Machinery Corp., Universal Engineering Co., Mixermobile Co., and Huber Mfg. Co. L. J. Hammond is President and Treasurer, George W. Lochner is Vice President, Bertram F. Bongard is Secretary, and William Rothstein is Controller. John Forster heads the Service Department; George Popp, the Parts Department.

Distributors for New Brik-Toter

The Brik-Toter Division of Mar-Rail Conveyor Co., Pawtucket, R. I., announces the appointment of distributors covering territories in the United States and Canada. The Brik-Toter is a recently developed materials-handling device for the construction industry.

The distributors named are as follows: *Arkansas*—Lyons Machine Co., 904 Broadway, Little Rock; *California*—Hughdon Equipment Co., 515 Brannan St., San Francisco; *Indiana*—Scaffolding Co. of Indiana, Box 67, Warsaw; *Louisiana*—Paul E. Taylor, P. O. Box 85, New Iberia; *Massachusetts*—Hedge & Mattheis Co., 285 Dorchester Ave., Boston 15; *Michigan*—J. M. Biscomb & Son, P. O. Box 364, Sault Ste. Marie; *Minnesota* — Minneapolis Equipment Co., 520 Second St., S. E. Minneapolis 14; *Missouri*—Western Machine & Engine Co., 5075 Manchester St., St. Louis 10; *New York*—J. H. Welch Co., Inc., 1245 McKinley Parkway, Buffalo 20; Van's Equipment Sales, Inc., Box 231, Rensselaer; and Hooper Equipment, Inc., 1256 S. State St., Syracuse; *Pennsylvania*—G. N. Crawford Equipment, 6714 Kelley St., Pittsburgh; *Washington*—Wallace R. Bohall Co., 75 Horton St., Seattle 4; *Wisconsin*—Prime-Best, Inc., 3820 W. Villard Ave., Milwaukee.

In Canada the distributors are T. A. S. DeWolf & Son, Halifax, Nova Scotia; and J. M. Biscomb & Son, P. O. Box 717, Sault Ste. Marie, Ontario.

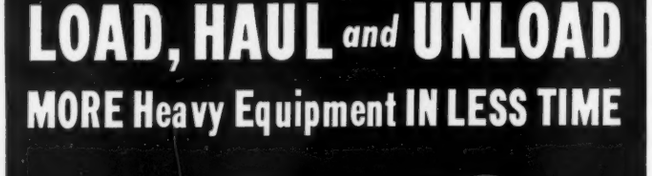
Larkin Holds Maintenance School

Chicago's Stock Yards Inn was the scene of an all-day class in Payloader operation and maintenance this summer. R. C. Larkin Co., with the cooperation of The Frank G. Hough Co., planned the program for Payloader owners and operators in northern Illinois.

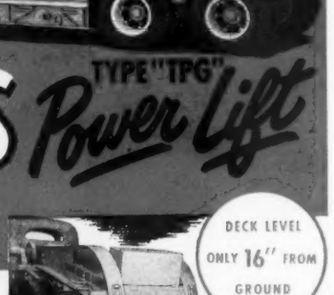
J. Awad, Parts and Shop Manager of

(Concluded on next page)

LOAD, HAUL and UNLOAD
MORE Heavy Equipment IN LESS TIME



ROGERS TYPE "TPG" Power Lift
DETACHABLE GOOSENECK



● Versatile performance features plus well known Rogers quality construction embodied in work tested design, puts the Type "TPG" Power Lift Detachable Gooseneck Trailer in a class by itself for an "all purpose" single unit.

If you contemplate the purchase of a new trailer, by all means investigate this increasingly popular model. Write for literature today.

Featuring 5 EXCLUSIVE ADVANTAGES

1. Carries heavier loads on larger tires.
2. Detaches quickly for fast, easy front loading.
3. Stoops to clear low overhead obstructions.
4. Raises its deck to clear high banked crossings.
5. Is detached, loaded and reattached in 5 minutes.

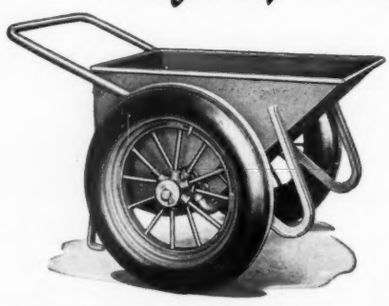
THE ROGERS Power Lift DETACHABLE GOOSENECK CAN BE OBTAINED ON ANY STANDARD ROGERS DROP DECK TRAILER

EXPERIENCE builds 'em — PERFORMANCE sells 'em
ROGERS BROS. CORP.
ALBION, PENNA.

Also of timely interest is this ROGERS Tag-A-Long trailer which makes a dump truck serve as a tractor and effects sizable savings for contractors.

CONCRETE CARTS
EASY to WHEEL—EASY to DUMP

Perfectly Balanced!



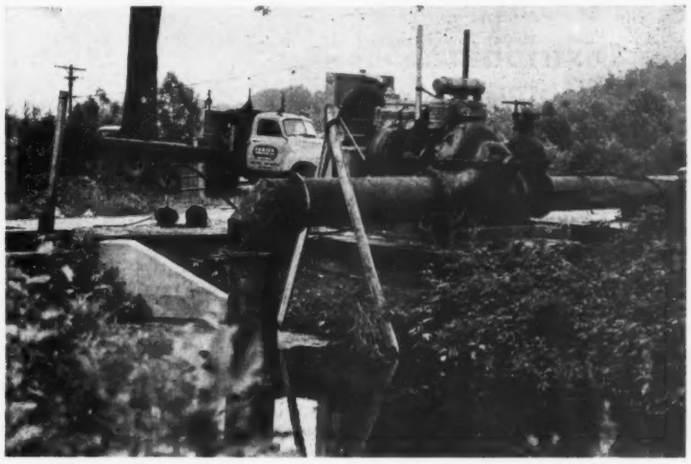
No. 626-PR Sterling Cart with dumping rockers and 4.00 x 18 pneumatic tires.

Just the cart you need for hauling concrete or other materials. Takes a full batch from small mixers without danger of spilling. 6 cubic foot capacity, water full. Sterling quality construction. Tray made of 14 gauge steel with continuous ½" diameter butt-welded rod to reinforce top edge. 1¼" T-iron rockers facilitate dumping. Roller bearings standard equipment. Choice of 30" dia. steel wheels or pneumatics. Write for Sterling Cart Catalog No. 63.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.
Look for this Mark of STERLING Quality
Sterling WHEELBARROWS

A 5751-¼

Hough Payloader owners and operators were eager beavers at the R. C. Larkin Co. maintenance school in Chicago this summer.



Something had to be done in a hurry when 14,000 acres of valuable farmland near Gale, Ill., were threatened by floods. Fabick Bros. Equipment Co., Sikeston, Mo., rushed a Caterpillar D375 diesel engine to the scene to power a 60-foot-head Ingersoll-Rand centrifugal pump. Operating at 700 rpm and pumping through 700 feet of a 20-inch line at 12,000 gpm, the pump saved the rich lands.

Larkin, directed the program. Instruction covered the importance of proper periodic lubrication, and the care and adjustment of the hydraulic cylinders, valves, transmission, steering gear, rear axle, brakes, the engine, and all other important parts—with special attention to preventive maintenance as a route to longer life and more economical operation. All Payloader models from 12 cubic feet to 1½ cubic yards in capacity were on hand for display and demonstration. The morning session recessed for luncheon in the Stock Yards Inn dining room adjacent to the class and lecture room.

The company plans to hold a similar school in the Rockford area as soon as its new branch house and demonstration field can be readied. It also plans winter and spring schools for crawler tractors and power shovels.

Thor Display Draws Havana Crowd

A life-size plastic dummy operating a Thor paving breaker, complete with noises off-stage, made a window display that brought sidewalk crowds to a standstill in Havana, Cuba, last July.

Independent Electric Co., Havana distributor for Independent Pneumatic Tool Co., Aurora, Ill., staged the show in its new branch building. The dummy, wearing workmen's overalls, operated

(*Concluded on next page*)

dewater the Complete way

Stay out of the wet and you stay out of the red! Get "Complete" — the equipment, the experience and the personnel that prove superiority by *complete* dewatering when other ways fail!

Write today for Complete Catalogue
Dept. CEM

COMPLETE MACHINERY & EQUIPMENT COMPANY, INC.
36-40 11th STREET
LONG ISLAND CITY, N. Y.

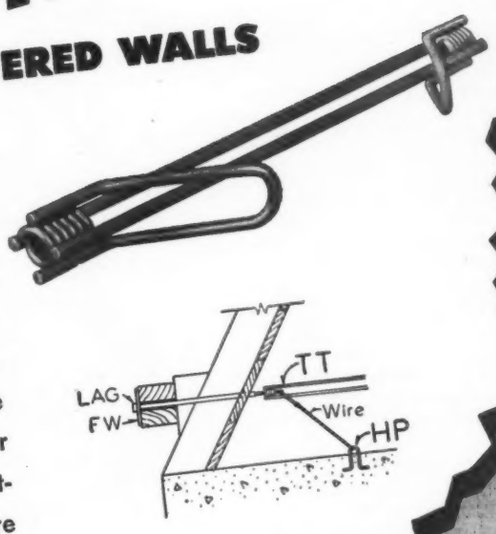
Branch Warehouse
3rd AVE. & ADAMS ST.
GARY, INDIANA

COMPLETE WELLPOINT SYSTEMS
FOR SALE OR RENT

ENGINEERED TYING DEVICES, ANCHORAGES and ACCESSORIES for CONCRETE CONSTRUCTION

THIS TIE DOWN TYSCRU PREVENTS UPLIFT ON BATTERED WALLS

The Richmond Tie Down Tyscru offsets any tendency towards uplift of the form where construction is off the perpendicular. It is a standard 2-strut Tyscru with a 45° Tie Down Loop at one or both ends. The loop is wired to a Hairpin or Ty-Loop imbedded in the footing. Particularly useful where extreme batter tends to cause an uplift in the form.



Get your "Screwy" or "TY" button—write to Tom Killen at Richmond, 816 Liberty Ave., Brooklyn 8, N. Y.

INSIST ON RICHMOND
... AND BE SURE IT'S RICHMOND!
Richmond SCREW ANCHOR CO., INC.
816-838 LIBERTY AVENUE · BROOKLYN 8, N.Y.

RICHMOND KNOW-HOW—DEPENDABILITY—SERVICE—ESTIMATES & JOB PLANNING

Distributor Doings

(Continued from preceding page)

his paving breaker on a rock pile made of papier-mache. The realistic noise accompanying his efforts came from an electric motor underneath the mache, which vibrated the tool.

Arizona, Oklahoma Appointments

Two more distributor firms have taken on Bucyrus-Erie ⅜ to 4-yard gasoline, diesel, and electric convertible excavators; 2 and 3-ton Hydrocranes; and the Hydrohoe. They are State Tractor & Equipment Co. of Phoenix, Ariz., and McCormick Machinery Co., Tulsa, Okla. McCormick will also handle the Red Arch dragline buckets. Its territory includes the part of Oklahoma east of and including the counties of Osage, Pawnee, Payne, Creek, Okfuskee, Seminole, Pontotoc, Garvin, Carter, and Love.

Putnam Joins Northwestern

Clarence C. Putnam has joined the staff of Northwestern Equipment, Inc., Fargo, N. Dak., as Advertising and Sales Promotion Manager.

Handles Cleco in California

Elect Air Tool Co. of Burbank and W. E. Mushet Co. of San Francisco are now handling Cleco and Dallett air tools and accessories in California, according to the Cleco Division of the Reed Roller Bit Co.

Dealer for New England Carbide

Oliver A. Hahne & Co., Chicago, Ill., has been appointed representative in the Chicago area for The New England Carbide Tool Co., Cambridge, Mass., manufacturer of carbide sharpeners, scrapers, routers, and masonry drills. The company's most recent development is a guide for masonry drill bits.

Equipment Dealers—this is your department, so send in your news—all about your new plants, new lines handled, new staff appointments.

J. P. Foster Co., Sioux Falls, S. Dak., sold 5 Caterpillar DW20 wheel-type tractors and matching 20-cubic-yard No. 20 scrapers to Western Contracting Corp., earth-moving contractor on the Fort Randall Dam project. Above, left and right, are Milton Wolff, serviceman for Foster, and Herman Holderby, Master Mechanic for Western. At right, Wolff gives a DW20 on-the-job maintenance.

Data Books for Engineers

A series of ten new and completely revised data books for engineers in the construction field have been announced by Lefax, Philadelphia 7, Pa. They include: Architecture, No. 601; Builders' Data, No. 628; Building Construction and Design Aids, No. 648; Highway Engineering, No. 611; Hydraulics, No. 612; Lumber Data, No. 631; Reinforced Concrete, No. 618; Steel Forms and Shapes, No. 622; Surveying Tables, No. 649; and Surveying Theory and Practice, No. 623.

The books are pocket-size and contain approximatey 140 looseleaf pages of selected data. Their price is $1.00 each. A catalog with more than 2,000 book listings is available without cost.

HENRY . . . BUILDERS OF EARTH-MOVING EQUIPMENT

HENRY HYDRAULIC BACKHOE

Speed up and cut costs on every digging job. Easy to operate. Bucket has 7' digging depth . . . maximum reach 11' and swings 60° to either side. Bucket sizes 12", 14", 16" and 18".

HENRY HYDRAULIC SCRAPER

Digs, Hauls, Dumps, Spreads. Saves time and labor. All steel constr. Fully guaranteed. Five models from 1¼ yd. to 6 yd. capacity.

HENRY HYDRAULIC BULLDOZER

Inside pushbeam permits use of shorter moldboard, giving tractor added reserve power. Henry Dozer DI-84-9 for Int'l. tractor T-9 or TD-9. Henry Dozer DI-84-5 for Allis-Chalmers HD5B tractor.

HENRY Manufacturing Co., Inc.
1718 North Clay St.
TOPEKA, KANSAS
Write for Complete Details

Plenty of Push...

...but NO Push Beams!

Push beams are eliminated *entirely* in the revolutionary new *highway wide* Baker 9-X 'Dozer. Bulldozer and engine frame form an integral unit. Blade responds instantly through double-acting cylinders, which raise and lower tractor-dozer unit. And tying it all together, making it work, is an entirely new design in *stabilizer bars* and *horizontal bearings.*

Here are some of the advantages for many jobs:

HIGHWAY WIDE: Width only eight feet—96 inches—exactly the same as standard highway trailers. Haul the Baker 9-X anywhere, anytime, *day or night,* with NO SPECIAL PERMIT.

PLENTY OF PUSH: Mounted right on an Allis-Chalmers HD-9, the moldboard is 6 inches higher than standard blades to provide almost same blade area, for plenty of push, plenty of capacity—with the famous Baker "move-more-dirt" moldboard curve.

IN FAST, OUT FAST: Steeper angle of approach on the blade because of close coupling. You can get in fast, out fast,

with the Baker 9-X Dozer. Makes it the ideal unit for jobs like slush pits; *makes it the most practical dozer* of all for small-home basements.

FULL LIFT, FULL DROP—Maximum lift is a full 37 inches, maximum drop is full 13 inches.

SURE-FOOTED CENTER OF GRAVITY: Even with blade at maximum lift, center of gravity is 6⅜" behind second roller—not more than a few inches ahead of center of gravity in unmounted tractor. YOU CAN LEAVE BLADE ON FOR DRAW BAR WORK.

LIGHTER: Takes 1,150 lbs. less steel to build . . . costs less to buy. See the new, revolutionary *highway wide* Baker 9-X Bulldozer—another triumph of Baker, Allis-Chalmers engineering cooperation, at your Baker, A-C dealer.

Heavy insulation and an inset faucet are features of the Igloo container.

Hot or Cold Liquids Carried on the Job

A portable container insulated to keep water cool or coffee hot for many hours is manufactured by Bettis Corp., 320 S. 66th St., Houston 11, Texas. The galvanized sides of the Igloo water cooler are corrugated and seams are double-folded to take rugged handling. The carrier is available with or without a push-button faucet, inset flush with the side to keep from being broken. The thick layer of Dow Stryofoam between the inner and outer walls is an effective insulation, the company says. Two heavy carrying handles protect the top cover, removable for filling. Igloo containers are made in 1½, 3, 5 and 10-gallon sizes.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 739.

Adhesive Map Type Speeds Drafting Work

Engineers and draftsmen weary of hand-lettering maps, charts, and drawings will be interested in the "Trans-Adhesive Map Type Specimen Book" announced by Monsen-Chicago, Inc., 22 E. Illinois St., Chicago 11, Ill.

Monsen Map Type is designed to eliminate costly hand lettering and applying small typographic detail with paste or liquid cement. The booklet explains how place-names, descriptions, numerals, symbols, etc., are printed to any specification on sheets of Monsen Trans-Adhesive. These are crystal-clear acetate sheets, backed with a pressure-sensitive adhesive. Monsen Map Type is printed on the under side of the sheet in opaque black, white, or colored inks. A stroke of a stylus (furnished) cuts free the words the user wishes to mount. Square edges aren't necessary, because only the opaque printing shows.

The type is simple to apply, the company says. "Lay a word lightly on the drawing, and shift freely until it is in exact place. Then burnish it down, and it becomes a permanent part of the drawing. The acetate is transparent when burnished. Lines beneath the acetate show through clearly, and reproduce with exactly the same clarity as all others; only the inked portions are opaque."

The booklet shows examples of over 100 styles of type. Each face is displayed in sizes from 6 point to 24 or 36 point. Many faces are shown in full size, and in 20, 25, 33⅓, or 50 per cent reduction. Standard code numbers are given for every face. A separate price list is enclosed. The booklet points out that correct accents and characters can be supplied for most foreign languages. In addition, it demonstrates how signs and symbols can be made to order.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 761.

It's not a bullet from Mars, but a drift pin that fell more than 30 feet from a blast furnace bleeder onto Boilermaker Louis D'Amico's head. A good thing he was wearing his MSA Skullgard.

Heavy-Duty Diesel Crawler

A 16-page catalog on the HD-15 diesel crawler tractor has been prepared by the Tractor Division of Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. This 102-hp unit has 6 forward and 3 reverse speeds. Features outlined in the catalog include unit construction, easy shift transmission, 1,000-hour lubrication, 2-cycle diesel power, A-type truck frame, and hydraulic steering. All are clearly illustrated with photos and drawings. Complete specifications, and data on allied tractor attachments, are also provided.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 713.

Defense is everybody's job. Buy U. S. Defense Bonds regularly.

SAVE 1/3 ON PORTABLE ELECTRIC PLANTS

New Winpower Portable Plants, powered with heavy-duty Wisconsin engines save you approximately ⅓ on purchase price. Especially designed for contractor use.

300 to 10,000 Watts, A.C. or D.C. Quality built for 25 years. Famous for long, dependable service.

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WINPOWER MANUFACTURING CO. — Newton, Iowa

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And Velvetouch lasts longer because it's all-metal.

That's why leading tractor and earthmoving equipment manufacturers use Velvetouch. They specify Velvetouch wherever heavy duty operation puts an extra load on clutch plates, facings and brake linings. Because they know from experience Velvetouch delivers dependable, uniform service that keeps equipment off the repair rack and on the job.

Insist upon genuine, all-metal Velvetouch friction products on your next replacement order . . . and prove to yourself the extra service . . . the extra savings you get with Velvetouch.

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Pressure Pipe Laid To Carry City Water

Concrete Transmission Mains, 60-Inch and 48-Inch, Are Part Of $7,000,000 Project at Mobile, Ala.; 16 Miles of Pipe

• MOBILE, Ala., is spending approximately $7,000,000 on its water supply, involving such new items as a dam and reservoir, pumping station, transmission mains, and raw-water basin. The dam for the Big Creek Water Supply Project (see C. & E. M., September, 1951, page 62) will impound a reservoir that will insure a safe yield of 100,000,000 gallons daily. From the reservoir the water will be pumped through a 60-inch reinforced-concrete pressure pipe, 9 miles long, to a 50,000,000-gallon raw-water basin located at the existing filtration plant.

From this point, part of the water will be treated and turned into the distribution system of the city for domestic consumption. The rest, to be left untreated, will flow through a 48-inch RC pressure pipe, over 7 miles long, to North Mobile, where it will serve large industrial plants. The project got under way early in 1950 and is scheduled for completion by the end of this year, with water from the reservoir to be available early in 1952. J. B. Converse & Co., Inc., of Mobile is consulting engineer for the water project, and supervises construction on all contracts.

Big Pipe Contract

Largest single contract on the project, exceeding in cost the $1,362,947 dam contract, covered the manufacture of RC pressure mains totaling 48,000 linear feet of 60-inch pipe, 38,000 linear feet of 48-inch pipe, and approximately 2,000 linear feet of 36-inch pipe. The pipe contract was awarded to the Lock Joint Pipe Co. of East Orange, N. J., on a bid of $2,007,711. The firm set up a new plant in Whistler, Ala., a few miles north of Mobile, in which all the pipe was manufactured.

Another contract for laying the pipe was awarded to the Carruth Pipe Line Corp. of Baton Rouge, La., on a bid of $387,579. Two pipe-laying crews were employed, each force equipped to dig trench and set pipe. Carruth picked up the pipe at the plant and trucked it to the site using four trailer trucks for the average 10-mile haul. Loading was done with a winch. A 16-foot length of 60-inch pipe weighed 12 tons.

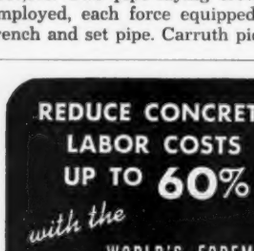
Trenches were dug with dragline and clamshell buckets, the maximum depth of cut being about 18 feet. As the pipeline was located in open country, side slopes were flattened out and very little shoring was required in the trenches. At six creek crossings, however, wellpoints were installed to dewater trench

(*Concluded on next page*)

C. & E. M. Photo

A P&H crane with a 70-foot boom used a single line to set a 16-foot length of pipe on the Mobile, Ala., project. The pipe, 60 inches in diameter, weighs 12 tons.

REDUCE CONCRETE LABOR COSTS UP TO 60% with the WORLD'S FOREMOST "SHAKE-DOWN ARTIST"



The one-man Vibro-Plus Roll-gear Internal Vibrator will help you roll back rising labor costs and do a better job.

Available in electric, gas-engine or pneumatic-driven models delivering from 11,000 to 15,000 V.P.M. Exclusive patented features assure years of trouble-free operation.

Write for complete details and name of nearest distributor.

VIBRO-PLUS PRODUCTS, INC.

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GAR-BRO Power-carts MOVE MORE CONCRETE at less cost!

ONE MAN AND A POWER-CART can do as much work per day as 6 to 10 men with wheelbarrows or 3 to 4 men with push carts *because the Power-Cart handles more (up to 14 cu. ft.) and travels faster (up to 12 mi. per hr.).*

On the Power-cart the driver *rides*— uphill, downhill, on 5 ft. runways or over rough ground. He can start fast and stop fast. Has complete control to dump the load or place it carefully.

Get the complete facts; write for Bulletin No. 83.

EQUIPMENT GAR-BRO ENGINEERING SERVICE

EVERYTHING FOR FASTER HANDLING OF CONCRETE

Buckets

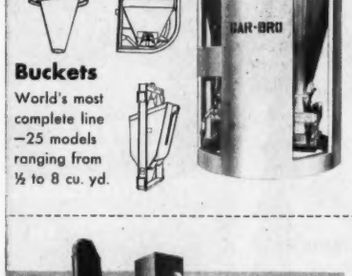
World's most complete line—25 models ranging from ½ to 8 cu. yd.

Hoppers

Includes portable, tower and floor hoppers (28 models) with cap. to 10 cu. yds.

Carts

Power-carts with concrete tray, box tray or platform (cap. up to 14 cu. ft.—2000 lbs.). Also six models of hand-push concrete carts.



Unit Batch Plants

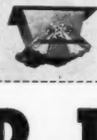
A variable combination of portable aggregate and cement storage bins with traveling weigh hopper.

Chutes

A complete line of concrete collection hoppers, steel drop chutes, rubber elephant trunk & line chutes.

Barrows

complete line (35 models) with steel or aluminum trays and with wood or steel handles.



Bin Gates and Weigh Hoppers in all styles and types.

write for catalog

GAR-BRO MANUFACTURING COMPANY

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sections in low areas from 250 to 450 feet in length. A Moretrench system was used, consisting of a 6-inch pump and 500 feet of 6-inch header pipe that was laid along one side of the trench. Risers were spaced on 2½ to 5-foot centers, and were jetted into place with a jet pump.

Typical operations of one pipe crew consisted of opening the trench with an Osgood dragline equipped with a 50-foot boom and a Hendrix 2½-yard bucket. Fine-grading around the bottom of the cut was done with a P&H crane using a 70-foot boom and a 2-yard clamshell. The P&H rig then set the pipe to a tolerance of ⅝ inch at the joints, which were grouted both inside and out. Backfill was dozed into the cut by an Allis-Chalmers HD-19 tractor, and hand-tamped up to the center line of pipe. Carruth Pipe Line Corp. employed an average force of 40 on the contract under the direction of H. B. Zuber, Superintendent. The work will be completed this fall.

Other Contracts

The pumping station at the reservoir, for pumping the impounded water through the 9-mile stretch of 60-inch pipe to the new basin at the filtration plant, is under contract to Bernard & Byrd Co. of Mobile. The station with pumps and motors will cost around $500,000. Difficulty is being experienced in obtaining the necessary Z-type sheet piling for the construction of the station, which will be equipped with 7 Layne turbine pumps rated at 20 mgd each, and driven by 800-hp synchronous motors. The station will readily handle 110 mgd against a 245-foot maximum head.

At the filtration plant, the new 50,000,0000-gallon raw-water basin is located on a hill having an elevation of 220.0, thus permitting gravity flow into Mobile and to the industrial area north of the city. The basin is being constructed by Dozier Bros. Construction Co. of Montgomery, Ala., at a cost of $175,000. About 200,000 yards of dirt is being excavated to form the basin which will be lined with Gunite. The new basin will be connected to the existing Bienville reservoir, capacity 20,000,000 gallons, also located at the plant.

Dozier also has a $300,000 contract for clearing 4,200 acres within the reservoir. A force of 100 men is engaged in this work which started in January and is expected to be completed by November. Trees above 10-inch diameter are cut down by hand, and pulled into clearings with a pair of double-drum skidders for hauling away. Cable on these rigs is 1,000 feet long.

Smaller growth is felled with V-type cutters mounted on a Caterpiller D7 and an International TD-18 tractor. Brush is handled with a rake mounted on the front of a D7 tractor, and piled up with a lift fork used like a front-end loader on an International TD-9. All brush is burned. J. W. Roberts is Superintendent on the clearing contract.

Revenue-Bond Financing

The water-supply project is financed by the sale of an issue of $7,000,000 worth of revenue bonds, with earnings assigned for their amortization. The city was assisted in these transactions by two large Mobile industries that contracted to use at least 10,000,000 gallons daily from the water supply developed.

The staff of J. B. Converse & Co., Inc., consulting engineer, is under the direction of J. B. Converse and H. E. Myers.

Carbide-Tipped Hammer Bit

A pocket-sized folder describing Thunderbolt carbide-tipped hammer bits is available from New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass. It tabulates standard lengths, specifications, and prices, and includes job cost data and photos showing the bits before and after extensive use. The company points out that these bits fit any electric or pneumatic chipping hammers.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 701.

Catalog on Excavator

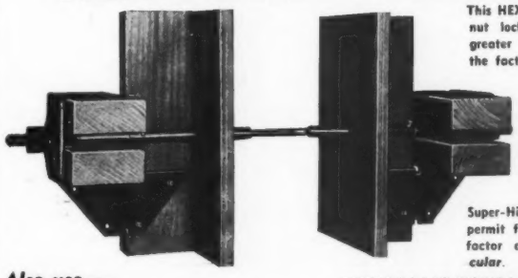
A catalog on the Model 2000 excavator, convertible to a 25-ton crane or 1¼-yard shovel, has been released by Manitowoc Engineering Works, 16th and River Sts., Manitowoc, Wis. Twelve pages of text and photographs describe construction and operating features of the machine. Features explained for the first time are a new shovel crowd-chain arrangement and swivel-type dragline fairlead.

Pictures show how the Manitowoc plunger drum clutch operates, and how swing-clutch linings can be replaced in a few minutes. Individual diagrams show working ranges for crane, hoe, and standard and high-lift shovel front-end attachments. A crane-capacity chart covers the lifting capacities from 12 to 70-foot radii. Data on optional equipment and general specifications are also provided.

This literature may be obtained from the company by requesting Catalog 20-51, or by using the Request Card at page 16. Circle No. 737.

New FORM TIE development

HEX-LOCK—SINGLE-UNIT



This HEXLOCK Clamp has a floating nut locked in place. This permits greater ease of operation, due to the fact that you are turning metal on metal instead of metal on wood. This Clamp can also be used directly with our Vibro-Lock Clamp in cases where walls may have a steep batter on one side only. All our clamps employ Super-Hi Tensile Inner Rods, which permit faster pouring with a known factor of safety. *Write for Circular.*

Also use —
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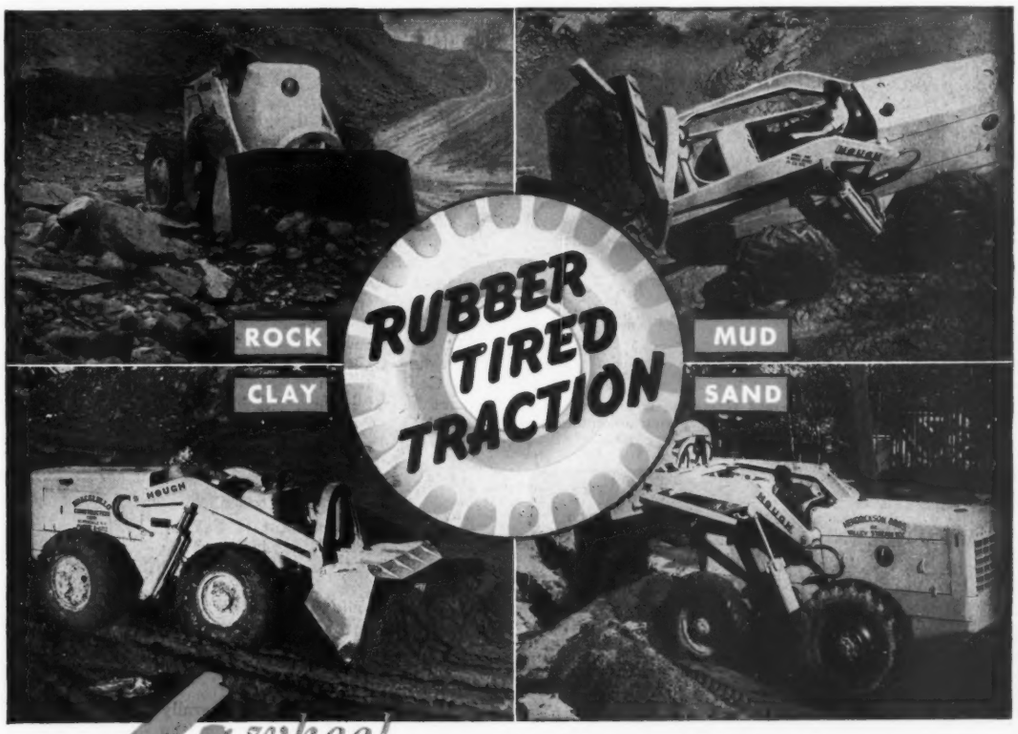


4 wheel drive **PAYLOADER**

Traction-Speed-Mobility

You get more of everything with this rubber-footed tractor-shovel. With its combination of 4-wheel drive and large pneumatic tires the Model HM PAYLOADER gives you fast-action traction on all kinds of footing — on sand, stone, snow, clay or mud. It gives you crawler-like traction at far less maintenance expense, PLUS speed when you want it and the ability to work on pavements and travel over streets and highways at 16 M.P.H.

You also get easy operation and maneuvering speed thanks to power-boosted steering and full reversing transmission with 4 speeds reverse as well as forward. Once you see one in action you'll know why hundreds of contractors as well as road and street officials are highly satisfied users of Model HM PAYLOADERS. Full information on this and other sizes of PAYLOADERS is yours for the asking. The Frank G. Hough Co., 762 Sunnyside Avenue, Libertyville, Illinois.

WRITE for literature on any size PAYLOADER: the 1½ yard Model HM; the 1¼ yard HY; the ¾ yard HF; the ½ yard HE; the 12 cu. ft. HA. There is no obligation.

SAY "HUFF"
PAYLOADER®
THE FRANK G. HOUGH CO. • Since 1920

Texas Splits U. S. 80 for 18 Miles

At the crusher pit near the center of the Collins job, an Ingersoll-Rand wagon drill operating from a Jaeger air compressor puts down a drill hole.

The loosened caliche and hard-rock formation is dug out by a Koehring 605 shovel which loads it to Koehring Dumptors for transport to the crushing and screening plant.

At the bottom of the caliche surge bin at the plant, an old Barber-Greene feeder connected to a calibrating wheel dumps exactly 5 cubic yards of base material to waiting truck.

Major Reconstruction Divides Heavily Traveled Highway On Texas Plains Between Midland and Odessa

By RAYMOND P. DAY

• BETWEEN Midland and Odessa, where a hundred miles means nothing in the vastness of open Texas plains country, the Texas Highway Department and Collins Construction Co. of Austin are making the first major divided reconstruction of U. S. 80, the heavily traveled "southern route" many motorists know well. Some 18 miles, between Midland and Odessa, are being rebuilt at a contract cost of $950,000.

The construction work will make U. S. 80 throughout that distance a divided highway, separated by a 30-foot drainage esplanade. In addition, some service extras new to Texas are being added, for the Texas Highway Department has used the experience of the California Division of Highways and added about 4½ miles of service roads for various small business settlements along the route. This feature will allow through traffic to maintain high speed over the new highway, and stop traffic to pull out on the service roads.

Not to be outdone by modern-thinking designers of the Texas Highway Department, Contractor Bryant M. Collins and his organization have also come up with some extras. They've rigged up a calibrating feeder gate which automatically measures base material at the rock plant, and has reduced the crew at that point by 300 per cent. Collins also found a way to run caliche base material and hard rock mineral aggregate for the hot-mix *out of the same plant at the same time!* More about that later.

Special Features

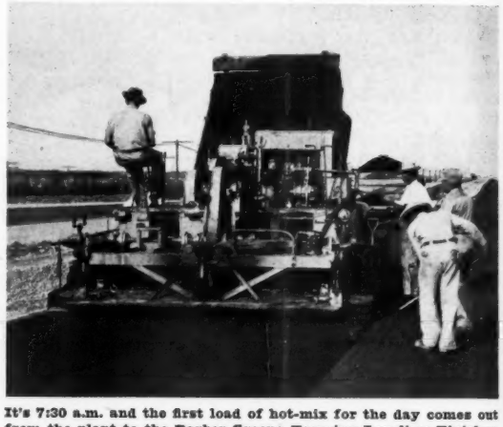
Before the Collins contract was let, an existing 24-foot 2-lane highway ran between Midland and Odessa, parallel to and only about 75 feet away from the Texas & Pacific railroad tracks. The highway roadbed had been built years ago by taking borrow from an area just north of and adjacent to the present road.

The new traffic lane lies generally over this old borrow area. All of the new-lane construction is north of the old one, and the peculiar historical and geographical feature made it necessary to bring in 345,000 cubic yards of roadbed subgrade from borrow. Only 139,000 cubic yards of grading were contained in the 18-mile job limits.

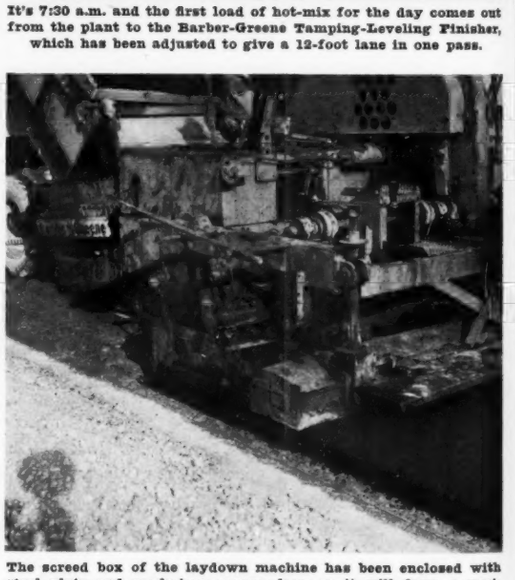
You can readily understand the Texas Highway Department's viewpoint when it made clear, via its specifications, that the new lane would have to

(Continued on next page)

The hot plant on the job is a Barber-Greene. In front of it here are (left to right) Resident Engineer G. T. Orenbaun, Contractor Bryant M. Collins, and Superintendent W. H. Clem.



It's 7:30 a.m. and the first load of hot-mix for the day comes out from the plant to the Barber-Greene Tamping-Leveling Finisher, which has been adjusted to give a 12-foot lane in one pass.

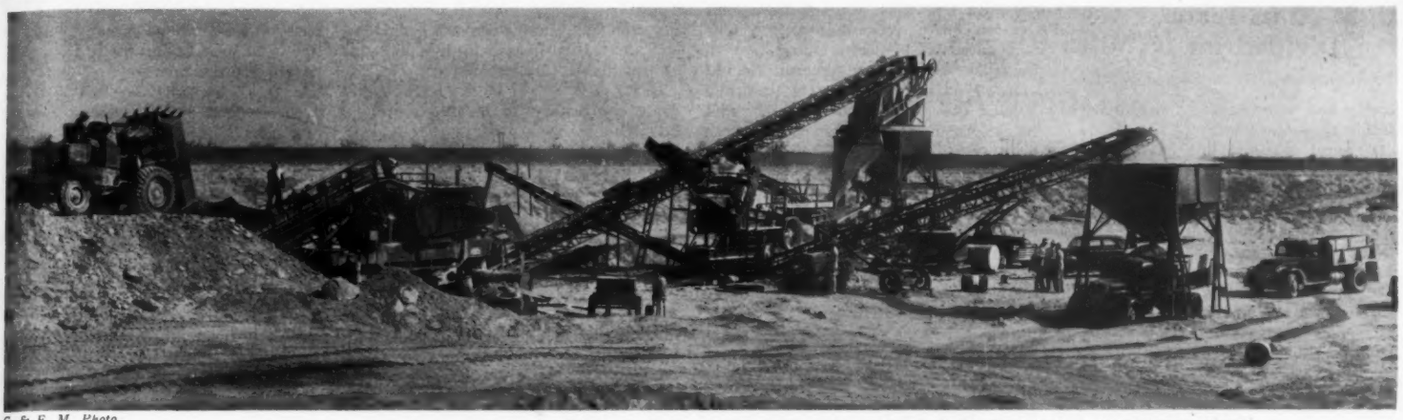


The screed box of the laydown machine has been enclosed with steel plate and angle-iron runner bars so it will form a neat, practically invisible center joint.

C. & E. M. Photos

A Tampo pneumatic roller compacts the caliche base which is 10 inches deep on the new lane of the U. S. 80 reconstruction. Now for the hot-mix paving.

Here's the rest of the center-joint secret: a 3-wheel Buffalo-Springfield roller moves up close to the laydown machine to give the joint a quick bull-rolling.



C. & E. M. Photo.

Caliche base material and hot-mix aggregate for the Texas U. S. 80 reconstruction were produced at the same time in this Pioneer plant.

be completed before Collins blocked off a section of comparable length on the old road—because it, too, called for some resurfacing. It was necessary for the safety of traffic to carry the 7,500 vehicles per day on the old road, therefore, until a new section had been completed to take the cars.

Where did that leave Collins?

It left him and all of his hot-mix shouldering material and all of his equipment *north* of the old road, separated from access on one side by a crazy stream of 70-mph traffic and separated on the other side by a railroad he couldn't cross.

Collins, who is about as genial and good-natured a man as you'll find anywhere in Texas, was scheduled for his share of frustration over this feature.

"I've watched 4 of my DW10's and 4 bottom-dump 'Eucs', loaded with shoulder gravel, all stacked up unable to move across the traffic stream, and two flagmen waving their heads off trying to slow down some of those drivers", Collins said. "And that costs money", he added.

It just happened to be one of those unfortunate and costly features nobody could help. And Collins had his share of praise for District Engineer L. D. Cabniss at Pecos, and Resident Engineer G. T. Orenbaun, "who cooperated just about every way a man could cooperate with a headache like that".

Collins' job includes grading, drainage, construction of a few culverts with grouted riprap aprons, production and installation of base material, paving the new lane and service roads with 3½ inches of asphaltic concrete, and adding 2 inches of asphaltic concrete to the old south road, which will now be the eastbound lane.

Both traffic lanes when completed will be 24 feet wide. The center drainage esplanade will be 30 feet wide. Each traffic lane will have 10-foot caliche-base shoulders, sloping off safely and gently to the drainage ditch. Service roads will be separated from the main highway by a drainage ditch. California ordinarily builds a fence to separate the traffic stream, but this feature was too

(Continued on next page)

BLADES For Snow and Ice Removal

FOR ALL MAKES AND MODELS OF SNOW PLOWS

Made of specially developed steel to withstand severe service conditions.

Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

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ESTABLISHED 1854

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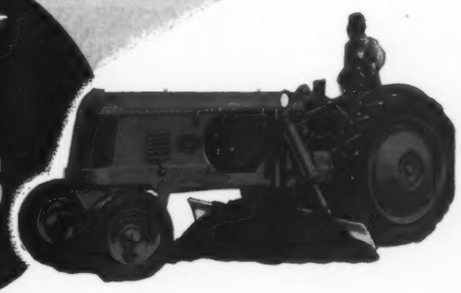
Some of the Jobs HUBER MAINTAINERS Are Doing



NATIONAL GOVERNMENTS

Grading and maintenance work on highways and secondary roads in national parks, reservations, national public lands.

STATES

Highway grading and maintenance service of many kinds including berm grading, mowing, ditch cleaning, etc.

COUNTIES

Highway and secondary road grading and maintenance work. Counties owning attachments keep HUBERS busy every month of the year.

MUNICIPALITIES

Street and alley grading and maintenance; every type of maintainer attachment is in municipal service.

TOWNSHIPS

Townships charged with road maintenance are among favorite users of Huber Maintainers for grader and maintenance work.

PUBLIC GROUNDS

Parks, playgrounds, conservation areas, publicly-owned beach areas need and use HUBERS for grader and maintenance service.

OIL FIELDS

HUBERS are at work in the oil fields, grading and maintaining off-the-highway roads and building dams around oil wells and storage tanks.

CEMETERIES

Cemeteries keep HUBERS busy every month, grading and maintaining drives, mowing, developing new grounds, removing snow, patching pavements, etc.

AIRPORTS

HUBERS are tailor-made for airport service, grading unpaved areas, patching paved areas, mowing, removing snow, towing planes, etc.

LOGGING

Grading and maintaining logging camp roads, mowing, bulldozer service.

INDUSTRIES

Many industrial users include factories with sizeable grounds and miles of roadways; lift loader widely used for cleanup work around factory sites.

MINES

Grading and maintenance of roadways; broom widely used around strip mines to sweep coal veins before removal.

ESTATES & RANCHES

Grading and maintenance of roadways; lift loader for cleanup; mower widely used.

RACE TRACKS

Grading and maintenance of track and of surrounding roadways and grounds.

CONTRACTORS

Contractors, large and small, in all kinds of contract work, are enthusiastic HUBER users. They like versatility of HUBERS, ability to move rapidly from one job to another.

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Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers

HUBER

U. S. 80 in Texas Divided for 18 Miles

(Continued from preceding page)

costly and unnecessary for the Texas traffic characteristic.

General requirements called for 90 per cent modified (AASHO) subgrade density, 10 inches of caliche base material on the new lane, 200 pounds of hot-mix per square yard on the old-lane resurface, and 325 pounds per square yard on the new-lane paving. This was split equally, 162½ pounds in each of two courses, using Texas Type C asphaltic concrete.

Grading Starts It Off

The job got under way officially about October 1, 1950, when Collins moved in with grading and culvert-building equipment to rough in the north-lane roadbed. Four Caterpillar DW10's with scrapers moved in for the straight grading. Assisted by a roaring D8 push cat, they gouged down into the raw earth, picked up their loads, and rolled off to the dumping spot on the fill. There were several No. 12 motor graders on the project, and they leveled the dirt off while water tank trucks hauling from a nearby air base about 8 miles west of Midland sprinkled moisture if necessary. D8's with pairs of heavy Tampo sheepsfoot rollers then worked the material down to high density by making as many as 8 passes over the area.

Borrow material, of course, was the main feature of roadbed construction. Five widely scattered pits were designated, and hauls ranged up to 6 miles one way. The fact that pits were scattered so widely didn't mean a scarcity of good material. The Texas ranchers who own the land in this part of the state simply think more of native grassland than they do of borrow pits excavated by state men and contractors. Many of these ranchers own so many oil wells, since geophysical crews have located a rich new deposit here in the Permian Basin, that they are considerably more than financially independent of any royalty inducement.

Some of these old boys, just to make things interesting for the state highway men, give them permission to core-drill the land to find and sample good road-building deposits. After they've found them, the ranchers will then kick them out and refuse to let the material be dug.

One of the nearby towns has a big sign at its city limits reading "Welcome! In This City Live 2,500 Friendly People, And A Few Old Grouches!" There are those in the road-building business who believe the sign is apropos.

"You expect 'em to say 'No', said one man. "But these men out here say 'Hell, no!', and don't you know, that's about half insulting."

At any rate, five borrow pits had been arranged where there would be no trouble with property owners, and Collins moved in with equipment to dig it out. Hauling equipment consisting of four 13-yard bottom-dump Euclids was ganged around a 42-inch conveying loader, attached to the frame of one of the Caterpillar No. 12 motor graders. Clay, sandy clay, and even material up to dense caliche was successfully handled by this machine.

The pits were all spotty, however, so it was necessary to use a shovel in the toughest parts. Collins has tried to standardize his equipment around a few well known makes—Caterpillar, Barber-Greene, Pioneer, etc. The shovel he brought in was a 605 Koehring which loaded six 12-yard Schonrock trailers which were truck-drawn. These hauling units boiled the dirt into the road fill, where spreading and compacting equipment could get to work. The upper few inches of roadbed subgrade were positively compacted by Tampo pneumatic rollers, which helped the sheepsfoot tampers in that critical zone. The roadbed fills were finished out by tight blading to survey hubs, and the finished dirtwork was smooth and dense.

Caliche and Aggregate

The production of caliche base and hot-mix aggregate in the same plant at the same time is one of the most unusual features of the project. Collins arranged for rights to move in on a 3-acre patch of ground close to the center of the job. This area contains a thick deposit of rock which is a half-and-half blend of good caliche and a red, quartz-like hard rock so durable it gives a Los Angeles rattler-test reading of 31. This hard rock, moreover, is not porous or absorptive. It is an excellent hot-mix aggregate.

The deposit first requires drilling and shooting. Two Ingersoll-Rand wagon drills with 12-foot Timken steel and rock bits operate from a Jaeger and Gardner-Denver compressor. The holes are drilled on a straight 9-foot grid pattern. About 18 pounds of Du-Pont and Hercules powder is loaded into each hole, and the shots are fired by No. 6 blasting caps and a blasting machine. This loosens the formation sufficiently so a Koehring 605 shovel with 3 Koehring Dumptors can dig and move the raw material into the crushing and screening plant.

A Pioneer 30-foot feeder carries the chunks of material to a 24 x 36 primary jaw crusher, which has its jaws set to reduce the rock to 3-inch size. All

(Continued on next page)

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You can get ideal light construction levels made by David White

This low-priced, reliable David White Improved Light Construction Level No. 8020 is simple and easy to use. Telescope 10" long, 10 power. Graduated spirit level. 4½" dia. circle graduated in degrees in quadrants. Has leveling screws and clamp screws. Complete with instruction book, carrying case. plumb bob, hinged leg tripod, rod and target. List price: $33.00*.

The David White Improved Light Construction Level Transit No. 8022 is a low-priced, simple, complete combination instrument. Levels and plumbs from same set-up. Has same features of instruments costing $100.00 or more. 2½" graduated spirit level. Vertical arc 2½" graduated. Horizontal circle — 4½" graduated in degrees in quadrants. Base has 4 leveling screws and shifting center. Clamp and tangent screws for vertical arc and horizontal circle. Complete with instruction book, carrying case, hinged tripod, plumb bob and rod with target. List Price: $75.00*.

How many times have you wished for easy-to-use, low-cost levels and transits? Instruments ideally suited to light or rough construction work — basement excavating, landscape grading, trenching, tiling, concrete work, laying out building lots, etc. Here's your answer. These instruments are fully guaranteed. Small contractors have successfully used them for years. Big contractors often supply their individual crews for on-the job service. See them at your nearest David White dealer or write direct for literature. DAVID WHITE COMPANY, 313 W. Court Street, Milwaukee 12, Wis.

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*Prices subject to change without notice.

raw material goes through this jaw. Throughs then pass up a 100-foot conveyor belt to a Pioneer 4 x 12 shaker screen which has 1½-inch square holes in its mesh. Due to some peculiarity in hardness and specific gravity of the various materials, the caliche at this point has been reduced so that it will fall through this screen. It passes through and over a conveyor to a 25-yard surge bin, where it can be loaded out as base.

But the material retained on the screen is all good hard rock. It drops immediately to a 40 x 22 Pioneer roll crusher, which is set to reduce it to 1¼-inch minus. It then goes up to a Pioneer duplex plant, which has been set in with the regular caliche plant to round out an interesting separation process. This plant has a 15 x 36 jaw and a 40 x 22 roll crusher, which reduces the rock down to ¾-inch minus.

Minus No. 4 material is separated into a dust pile and then used for blending as the aggregate storage pile is made. The entire gradation of material is placed in one pile at this point and separated for a 4-bin pull at the hot plant.

The crushing-screening plant is powered by 3 Murphy ME66 diesels, and is entirely a Pioneer plant.

Automatic Feeder Gate

At the bottom of the caliche-base surge bin, Collins and his crew have converted a brainstorm into one of the most practical, labor-saving field ideas ever seen. In years gone by the volume of material was measured by having truck beds of known size, but it took three or four men standing on a platform of some kind to level off the load to make sure it had the required volume. Why couldn't a feeder gate be developed which would measure out an exact volume and do it rapidly?

In Collins' yard there was a Barber-Greene feeder which was supposed to be worn out. Mechanics put in some new bushings and a few new parts and made it serviceable again. The feeder, hooked to a small electric motor, was connected by a chain drive to a small calibrating wheel. The back portion of the surge-bin feeder funnel was equipped with a sliding gate. In theory, so many revolutions of the feeder with the gate open so far should produce exactly 5 cubic yards, shouldn't it?

It took about 3 or 4 hours of trial-and-error fooling around with a dump-truck bed of exactly 5 cubic yards to calibrate the gate opening. When that calibration was made, volumetric output was so accurate and constant that 100,000 cubic yards were put out with no change in the gate setting. The trucks are filled just as fast as by the old method, and it takes only one man. The three or four laborer jobs which used to be necessary are now nonexistent.

The caliche base material is hauled out to the job by the Schonrock trailers. Two courses are laid to get the 10-inch compacted thickness. A 6-inch base course goes down first, and it is topped by a 4-inch course.

Manipulation processes are the same for both courses. The material is first windrowed by a No. 12 motor grader, and road-mixed while water is added to make the blend of particles uniform. It takes a lot of water to prepare caliche so it will "set up" right. The water comes out from the airport in water tank trucks which sprinkle it on in several passes.

When an intimate blend has been made, the motor graders cut into the windrow and lay it out in thin lifts. Two Tampo pneumatic rollers, working behind a DW-10 and an ID-6 tractor, come right behind the motor graders to compact the material. A 3-wheel 12-ton steel roller is also used to some extent. When the final tight-blading has been done to make the caliche smooth, and its surface has been checked true to crown and grade by surveyors, an Etnyre distributor puts on 0.3 gallon of MC-1 prime coat per square yard. Generally this prime is at least 3 miles ahead of paving. The prime is followed just before the application of hot-mix by a hand-sprayed fog coat of RC-2 tack, applied at the rate of 0.05 gallon per square yard.

Hot-Mix—Its Design

The hot-mix asphaltic concrete is known as Type C, and consists generally of a coarse-graded mix with a density of 96 to 98, and Hveem Stabilometer values of 46 to 54. An analysis of its coarser particles, the upper 60 per cent is as follows:

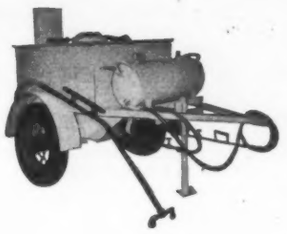
Retained on ¾-inch	1 per cent
¾ to ½ inch	18 per cent
½ to ⅜ inch	26 per cent
⅜ to No. 10	15 per cent

An analysis of the minus 40 material runs as follows:

No. 40	11 per cent
No. 80	9.5 per cent
No. 200	9.3 per cent
Passing No. 200	4.0 per cent
Asphalt (OA-135)	6.2 per cent

(*Concluded on next page*)

White Heating Kettles Have Fire-Proof Tops



Cut-back and highly inflammable road repair material can be heated safely in White kettles. FIRE-PROOF top reduces fire hazard.

White asphalt and tar kettles are extensively used. They give long life and satisfaction.

Plain kettles or with hand or engine driven spray pumps for patching pavement. Thermometer, barrel hoist, warming hood extra. All oil burning. Semi-elliptic springs, pneumatic tires.

65, 110, 165, 220, 300-gallon capacities.

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3 to 20-gal. capacities

THE DEMPSTER-DIGGSTER, Type GRD, same as the one that loaded 600 tons of stone recently, has a 15 foot six inch turning radius, is 20 feet long when bucket is in traveling position, and bottom of bucket is nine feet three inches above ground when in extreme dumping position. It will dig 15 inches below grade and through a 15 foot bank. Note how bucket follows the slope of the material.

THIS DEMPSTER-DIGGSTER, Type HL, is specially equipped for high dumping. The bottom of the bucket is 13 feet six inches above ground. It will dig through an 18 foot bank.

FOR FAST, EFFICIENT operation in difficult terrain, the Dempster-Diggster is available with crawler-type traction.

Fast Automotive Shovel Loads 600 Tons of Stone in Half a Day

CONTRACTOR REPORTS: HYDRAULIC CROWD, HOIST UNIT "FILLS LONG NEEDED PLACE IN OUR INDUSTRY"

THE DEMPSTER-DIGGSTER, a revolutionary shovel loader, recently loaded 600 tons of broken stone in the first half day of operation. This outstanding performance was reported to Dempster Brothers, Inc. by W. E. Lambert, president of Lambert Brothers, Inc., one of the nation's largest crushed stone contracting firms.

"In connection with our extensive activities in several southern states," the contractor said, "we have used various types of power shovels and front end loaders. After seeing the easy operation of the hydraulically operated Diggster in a demonstration we had made alongside of a competing loader, we placed an order with you. We installed the Diggster equipped with a yard and half stockpile bucket on one of our operations in western North Carolina.

"Our records show," he continued, "that the unit loaded approximately 600 tons of broken stone in the first half day of operation. The Diggster has been working continuously and is giving perfect satisfaction. It is a pleasure for us to so advise you because in our opinion the Diggster fills a long needed place in our industry. We welcome you to bring any interested parties to our operation to see the Diggster in action."

The tremendous speed of the Dempster-Diggster in excavation and stockpile work is accounted for, mainly, by its exclusive independent hydraulic crowd and hoist action, the hydraulic steering, and wheel-type traction, which permits truck speeds to and from jobs. The power crowd permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver easy, fast, finger-tip control.

Four standard interchangeable buckets of two types are available. Digging buckets with four bottom teeth in 1 and 1¼ cubic yard (heaped) capacities; materials handling buckets in 1½ and 2 cubic yard (struck) capacities.

Complete information and prices may be obtained by writing the manufacturer, Dempster Brothers, Inc.

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U. S. 80 in Texas Divided for 18 Miles

(Continued from preceding page)

The oil-asphalt originates in the Cosden Refining Co. refinery at Big Springs, Texas, and is trucked about 50 miles to the project.

Hot Plant and Laydown

The hot plant is a Barber-Greene 120-ton-per-hour rig, which Collins is operating at an average rate of 110 tons an hour. It is fired with natural gas, piped in about 2 miles, which operates the boiler and dryer burners. Steam is used for the heating of asphalt and the operation of asphalt pumps.

Asphalt storage is provided in a 13,000-gallon horizontal tank. MC-1 material is stored in an 8,000-gallon tank. The plant's auxiliary power includes an International diesel engine on the dryer, a Waukesha engine on the dust-collector fans, an International diesel on the pugmill, a 100-hp Oil Well Supply boiler, an International TD-18 with a Bucyrus-Erie blade to stack aggregate, and a Koehring 304 clam to charge the plant bins.

Separation screens on the plant, which produce the correct mixture, consist of a 3-deck arrangement 4 x 8 feet in size. The upper deck has 5 feet of ½-inch mesh, and 3 feet of ⅞-inch scalping mesh. Oversize on this scalping mesh drops off to a waiting truck, and when the bed is filled, this material is hauled to waste.

The second deck consists entirely of ¼-inch mesh, and the bottom deck consists entirely of No. 8 mesh. The action of these screens produces a 4-bin gradation with a minimum of waste or excess sizes.

Special care is being exercised so neither the asphalt nor the aggregate is overheated. Temperatures of rock or asphalt are not permitted to go above 310 degrees, and 280-300 is a good average. The finished material is dumped out into a fleet of 20 dump trucks which haul about 7 tons at a trip out to the laydown crew.

One setup of the hot plant is expected to do the 18-mile job.

Out on the highway, the hot-mix is being laid down by a Barber-Greene Tamping-Leveling Finisher, which has been adjusted to give a 12-foot lane at one pass. The machine runs to a string line to make the first lane, and the screed box has been enclosed with steel plate and angle-iron runner bars to form a neat joint. Visible evidence of a center joint has been largely eliminated by a combination of this runner bar, the crowding of the laydown machine into the previous strip on the second pass, and a quick bull-rolling of the joint close behind the laydown machine.

Collins has eliminated a great deal of the usual raking at the center joint by these mechanical processes. As a rule, two men work out in front with fiber brooms to knock any loose material away which has been dropped by the batch trucks. A small Grace power broom is often used if the surface gets the least bit dusty.

The mix is a nice one to roll, responding nicely even in hot weather. A preliminary bull-rolling is done first of all by an 8-ton 3-wheel Buffalo-Springfield machine. Its tracks are then eliminated by a Buffalo-Springfield 12-ton tandem roller. If the weather is excessively hot, pin cracks will develop, and the finish compaction is done the next morning by the heavier machine. In cooler weather, the heavy machine works late, after the rest of the crew has gone home, to finish up. Compaction and stability tests on this mix have been excellent, and its riding qualities are good.

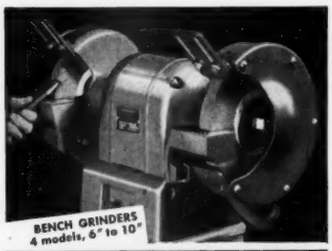
Working 10 hours a day, 6 days a week, the Collins organization is now pushing hard for a finish date by November 1, 1951. All indications are that the date will be made as scheduled.

Personnel

Bryant M. Collins, together with his father Bryant F. Collins, head up their own contracting organization, and by means of good airline connections right to the job, the younger Collins spends a great deal of time on the work. The General Superintendent is W. H. Clem.

The major improvement, which reflects the trend toward 4-lane construction on transcontinental routes, was designed and is being supervised by D. C. Greer, State Highway Engineer, with Jed N. Robinson as Construction Engineer. L. D. Cabniss is District Engineer, and G. T. Orenbaun is Resident or Project Engineer.

Red Feather Month—October, 1951—includes the United Defense Fund as well as Community Chests. Millions are needed for welfare and emergency services. Join your local United Red Feather Campaign with your help—and your dollars.



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"So I started keeping track. In our case, the jobs involving rope boiled down to a matter of tonnages moved. Wasn't at all hard to record what each rope accounted for in its lifetime. When I'd been checking long enough for the figures to have some meaning, I showed 'em to the boss. By then I could tell which make of rope was doing the best job for us, costwise and every way. The figures really opened our eyes!"

These men weren't the first to learn the value of checking rope performance. Many users of Bethlehem wire rope follow the practice regularly. We're always glad to see it, for it enables actual comparisons between brands . . . and we know that in any such comparisons, Bethlehem rope will stand out from the crowd.

Here's a fair suggestion: over a period of time, stack the Bethlehem product against any other brands of your choice. Keep tabs on them all, and at intervals study your figures. Our guess is, those records of yours will prove beyond question the solid economy—the long-term economy—of Bethlehem wire rope.

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Welded Steel Frame Lightens New Building

A Weight Saving of 25 Per Cent Is Realized When Architect Makes Speedy Design for New Addition To Spokane Hotel

• IT looked like a major disaster when the Ridpath Hotel in Spokane, Wash., burned on February 28, 1950. But exactly 6 months later to the day, Utah Construction Co. of San Francisco was placing the first concrete on a major reconstruction designed to repair the fire damage and enlarge the hotel. In that short time the damage had been surveyed and an all-welded design prepared by Ned H. Abrams, architect of Sunnyvale, Calif.

The design which Abrams worked out makes the new 100 x 155-foot 13-story building one of the lightest and strongest in the Pacific Northwest. A 25 per cent saving in poundage of steel has been achieved by Abrams' use of all-welded prefabbed construction to form the steel framework. Further reductions in weight have been achieved through the use of vermiculite plaster and Haydite lightweight concrete. Altogether, officials estimate that a weight reduction of one-third has been achieved when the hotel addition is compared to buildings of conventional construction.

Owners of the Ridpath took advantage of the fire to make the enlargement, because for some time Spokane has been a city without adequate hotel space for ever-increasing activity in that corner of the nation. The Ridpath is only a few blocks down Sprague Avenue from The Davenport, at present the leading hostelry. When Utah Construction Co. finishes its work November 15, 1951, the Ridpath will be able to provide some of the most comfortable and completely air-conditioned hotel accommodations to be found in Spokane.

Structurally, the steel design looks more like a good strong bridge than a building. There are a few 14-inch WF upright columns, with 2-inch plates welded in and fireproofed with lightweight concrete. Light, strong, open trusses carry most of the dead load to the columns. The transfer of load to wide areas between columns is most pronounced in the basement, where a large parking garage is provided for future patrons. The parking area is remarkably free from columns or other impediments.

All utilities in the new addition are run vertically, instead of horizontally. The first 12 stories of the building will be occupied by hotel activities. The University Club of Spokane will occupy the entire 13th floor, which will feature a sunken bar and seating arrangements along the outer perimeter of the building. Patrons will be able to see all over the city from this vantage point unobstructed by external supports. There will be a 2-story penthouse over the 13th floor. Construction is typical between the 4th and 12th floors. A window-washing monorail is installed at the roof to make it possible to wash all windows and clean the building from the outside.

To save on room, all plumbing units were prefabbed from copper pipe and fittings and brought up to the point of installation. Thermopane glass was used, and the top of the hotel was finished off with Cofar steel decking. Steel forms were used under the poured structural floor concrete. Steeltex was used for floor forms over bar joists. Twelve-inch modular face brick on the outside of the building was laid with 1 inch of grout spacing and steel wireties which led to Steeltex lath tied to the structural steel frame.

The construction design was such that it was possible to concentrate many work operations throughout the building and make exceptional speed. At one stage of construction, the last structural steel was going in on the penthouses, while plastering was up to the 3rd floor and plumbers were working on the 10th floor.

(Concluded on next page)

Photo Courtesy of Utah Construction Co.

Here steel erection is in progress for the addition to the Ridpath Hotel in Spokane, Wash. All-welded design saved 25 per cent in steel tonnage.

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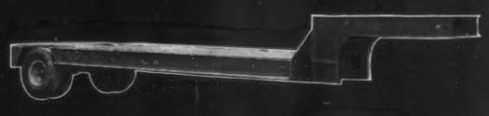

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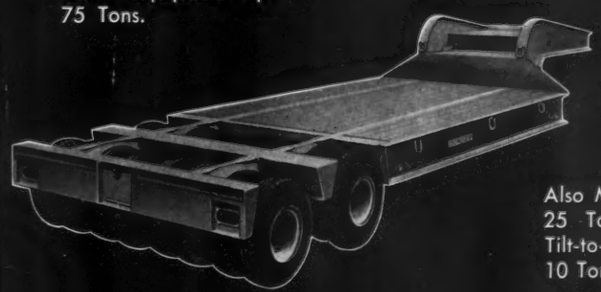

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ELBA, ALABAMA

"Makes the Heavy Jobs Light"

Welded Steel Frame Lightens New Building

(Continued from preceding page)

How Work Was Done

Excavation work under the hotel addition was handled by power shovel and trucks. The foundation material was such that spread footings were suitable.

Erection of the structural steel was possibly the most spectacular part of the project. Union Iron Works of Spokane furnished and fabricated the structural members, which were then hauled out to the site and erected by Dix Steel Building Co. of Spokane. A Lorain Moto-Crane with 123 feet of boom erected the first 4 floors of steel, which included all the heavy members. Field welding was done by 4 Lincoln machines and Fleetweld rod. When these floors were finished, the crane was dismantled and hoisted in several pieces to the 4th floor, where heavy timbering had been placed to carry its weight. Working from the 4th-floor position, the crane finished out the framework, and was lowered to the ground by the same 25-ton crane which had lifted it up.

Plastering, plumbing, and other such crafts then followed rapidly. Central Pre-Mix Concrete Co. batched the lightweight concrete and delivered it to the job in truck mixers. The material was then hoisted to the proper floor by a steel tower and hoist extending full building height.

Field operations for Utah Construction Co. were under the supervision of R. S. Hardie, Project Manager. Tom Ellis was General Superintendent, and Paul Looper was Assistant Superintendent. Glenn J. Chamberlain of Los Altos, Calif., and W. L. Malony of Spokane, Wash., handled structural engineering. Earl & Gropp of San Francisco was the Mechanical Engineer and Jack Reeves the Associate Mechanical Engineer.

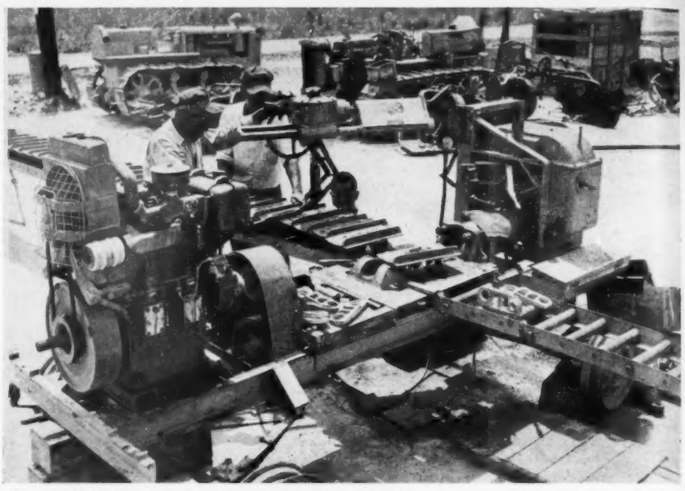
Reports the Tenth Course In Roadside Development

A report on the Tenth Short Course on Roadside Development, held in Columbus, Ohio, April 4-7, 1951, is the latest in the series to be published by the Department of Landscape Architecture of the Ohio State University and the Ohio Department of Highways, Columbus, Ohio.

To mark the completion of the first decade of these courses, this volume contains tables of contents of the nine previous Short Courses on Roadside Development.

The program this year opened with the dedication of Dupre Roadside Park on U. S. 23, 2.3 miles north of Worthington, Ohio, and the book, which is dedicated to Dallas D. Dupre, Jr., founder of this series of Short Courses, gives an account of the ceremony. It also contains reports of papers on a variety of subjects, covering landscape architecture, parkways, memorial parks and garden clubs; soil conservation, including erosion control, advancement in the use of ground covers, woody plants, and chemical weed controls; highway cross-section design; and highway maintenance.

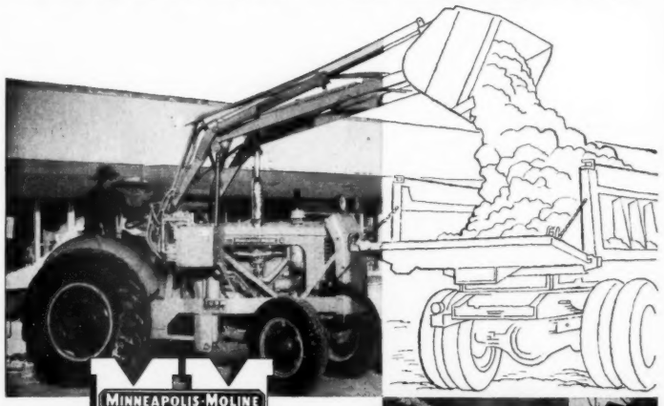
"Tenth Short Course on Roadside Development" may be obtained from Professor Charles R. Sutton, School of Architecture and Landscape Architecture, The Ohio State University, Columbus 10, Ohio, or Wilbur J. Garmhausen, Chief Landscape Architect, Ohio Department of Highways, Columbus 15, Ohio. The bulletin is free.



The Petter AV2 diesel which powers this Rodgers track press uses 1.5 gallons of fuel in 8 hours. Boyce-Harvey Machinery, Inc., New Orleans, uses it to replace a gasoline engine which consumed 16 gallons of fuel in the same period.

FORECAST:

COLDER with SNOW



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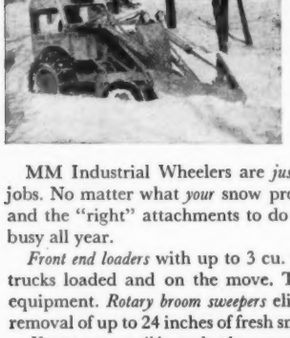

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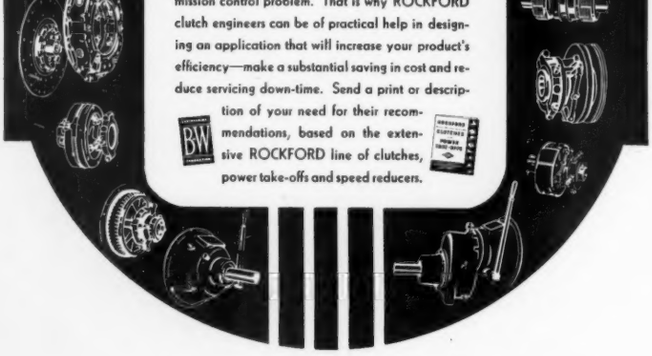

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More Flood Control Proceeds at Memphis

Project Includes Reservoirs, Levee, 66-Inch Storm-Water Conduit With 105 Feet Jacked Under Railroad Embankment

• WHEN Section 7 of the Wolf River project is completed some time around the end of the year, flood protection along the north city line of Memphis, Tenn., will be about three-quarters complete. Wolf River roughly parallels the north city line of the cotton capital on its way west to empty into the Mississippi River. In 1937, when the Mississippi was in flood, Wolf River backed up and inundated Memphis from the north. At that time the waters rose to elevation 234.6 mean gulf level, which is 50.4 feet above zero on the Memphis Beale Avenue gage.

Since the end of the war, the Corps of Engineers, U. S. Army, under the direction of the Memphis District, has been working to control any possible future floods that might threaten the city. One of the larger contracts in this flood-control program covered the construction of a reinforced-concrete wall, 2,800 feet long x 12 feet high, on a steel sheet pile foundation, to protect an important industrial area. (See CONTRACTORS AND ENGINEERS MONTHLY, December, 1947, page 54.)

The present contract, awarded by the Memphis District to the W. L. Sharpe Contracting Co. of Memphis on a low bid of approximately $277,000, extends the existing flood protection 2 miles farther east toward high ground. Principal features of the contract for Section 7 are: (a) construction of Workhouse Reservoir, including approach and ditch paving; (b) construction of 66-inch-diameter storm-water conduit from Workhouse Reservoir to Fairfax Reservoir, including conduit headwalls (the conduit has a total length of 2,000 feet); (c) construction of Fairfax Reservoir, including ditch paving; (d) construction of levee embankment; gravel surface on roadway over levee crown, and on the roadways and driveways adjacent to the pumping stations; concrete gutters; catch basins; drain lines; and a concrete stair with hand railing on the levee slope.

Two-Mile Project

Located along the left bank of Wolf River, the 2-mile flood-control project is partly within the city of Memphis and partly in Shelby County. At the west end it ties into the already completed Section 6 at a point between Harrison and Maplewood Streets, and extends eastward to Orr Street. The alignment is irregular, as the levee section follows high ground, thus saving on embankment material. There are four breaks in the fill where the elevation of the terrain does not require levee protection.

Because of the uneven topography, the height of the new levee varies considerably from a low of 2 feet at the western end to a high of 17.7 feet at the eastern end. Crown width is 24 feet with a 10-foot gravel roadway; maximum width through the base is 180 feet. On the river side the levee slope is 3½ to 1. On the land side the levee slopes at the rate of 4 to 1 for a distance of 60 feet out from the crown, then flattens to a 6½ to 1 slope for the remainder of the distance to the toe. The roadway along the levee crown will have a 10-inch clay-bound gravel base 10 feet wide.

At the western end the finished elevation of the levee is 245.46, while at the eastern end it is 245.7. This protection averages 11 feet higher than the greatest flood on record, which occurred in 1937. Building the levee, involving some 110,000 cubic yards of compacted fill, was subbed to the S. K. Jones Construction Co. of Memphis. Material for the embankment is provided by the reservoir excavations totaling around 227,000 yards, or considerably more than is needed for the fill. Excess dirt is wasted along the river side of the levee in low places where a bayou joins Wolf River.

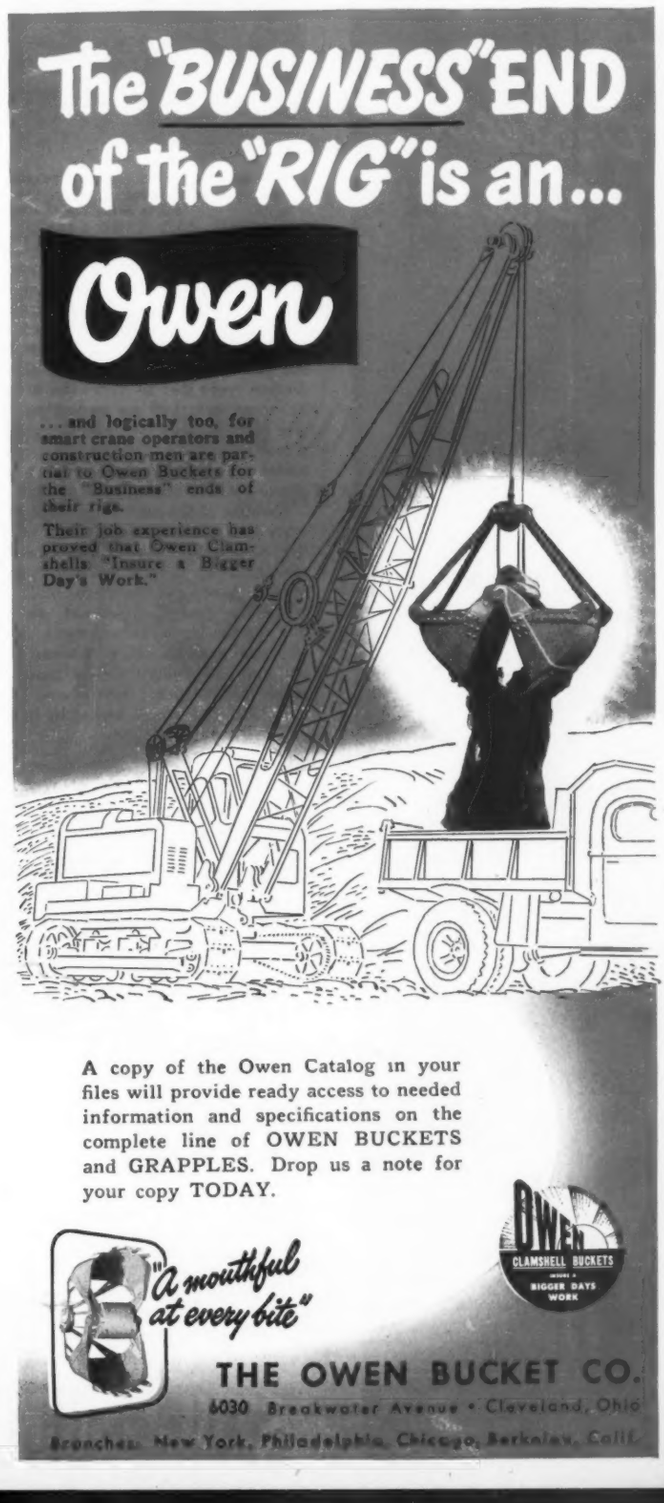
Reservoirs for Storage

Workhouse and Fairfax Reservoirs

(Continued on next page)

C. & E. M. Photo

At the forward end of the pipeline being jacked under railroad tracks, a skip loaded with muck is lifted by a Koehring 304 crane.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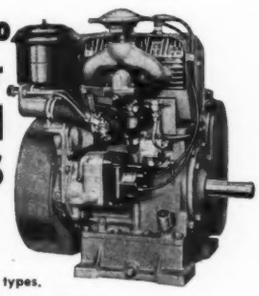

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MODELS		TF	TF
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Stroke	inches	3¼	3¼
Piston Disp. cubic inches		45.9	53.9
Horsepower			
1400 rpm		7.2	8.6
2000 rpm		10	12
2600 rpm		11.2	13.3
Net weight in lbs., Standard engine, side-mount tank		220	220

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More Flood Control Proceeds at Memphis

(Continued from preceding page)

are constructed behind the levee to provide storage area for storm water during high river stages when outlet gates through the levee are closed. At such times the Workhouse Pump Station, already built, will pump the accumulated water over the levee for discharge into the river. The existing Fairfax Pump Station serves the Memphis sanitary sewer system, but the new reservoir behind it will collect storm water. From the Fairfax Reservoir the water will flow easterly through 2,000 linear feet of 66-inch conduit to Workhouse Reservoir. Water from Workhouse Reservoir will be diverted to Workhouse Pumping Station; from there it will either flow by gravity or, during high-water periods, be pumped over the levee to an outlet channel leading to Wolf River.

Work on the project got under way on March 1 of this year, and the contractor hoped that with favorable weather through the construction season, he could finish the contract in November—even though 300 work days have been allowed in which to complete the job. The reservoirs were cleared, ditches were dug to drain the areas to be excavated, and an inspection ditch was opened along the levee center line, 6 feet deep x 7 feet wide. The ground under the base of the levee was also plowed before any fill was placed.

Because of the high river stage in the early spring, and the high water table in this area, excavation for the reservoirs was held up until the latter part of May. Access roads were built, and when the ground dried out, dirt was dug for the levee embankment. Material was mostly loess, with some sandy silt and silty clay; it was hauled as much as 3,000 feet, then placed in 12-inch lifts. It was compacted by hauling and dozing equipment exerting a unit pressure of not less than 6 pounds per square inch.

C. & E. M. Photo

A Watson-Stillman 200-ton hydraulic jack has jacked a pipe length 13 inches on the Wolf River project. Now, the plungers are retracted with railroad jacks to make room for the insertion of the first 12-inch blocks.

66-Inch Conduit

Ground water failed to hold up the laying of the 2,000 feet of 66-inch conduit connecting the reservoirs, which was handled by the general contractor. Pipe laying started at the low eastern end and proceeded to Fairfax Reservoir at the western end, with the pipe being laid uphill all the way. This method helped to keep the trench dry when the pipe was being placed. The Choctaw Pipe & Culvert Co. of Memphis supplied the extra-strength conduit. The reinforced-concrete pipe came in 5-foot lengths weighing 7,000 pounds each.

Trenches were dug and pipe set with two rigs—a P&H ¾-yard backhoe and a Koehring 304 machine equipped with a 35-foot boom and a ½-yard clamshell bucket. The maximum depth of trench was 24 feet. For the first 800 feet of pipe, at the lower end of the job, the ground water was such a problem that a Moretrench wellpoint system was used to dewater the trench. A 6-inch header line was laid out along one side of the trench, with 20-foot points extending to a level 4 feet below the flow line of pipe. At the start the wellpoints were spaced on 3-foot centers, but as higher ground was reached the spacing was increased.

At one location the 66-inch conduit paralleled a 21-inch sewer line for about 300 feet. To forestall any sloughing of the sides of the trench in this section, the contractor drove M-115 steel sheet piling, 20 feet long, along one side before the trench was opened. The sheets were spaced about 2 feet apart, and driven so that their bottoms were well below the flow line of the trench. At every third sheet pile a cross jack was installed, braced to a wale on the opposite side of the trench. Joints were caulked with a cement-

(Concluded on next page)

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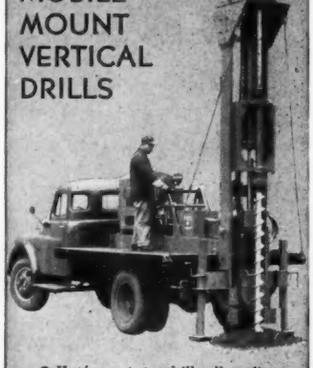

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C. & E. M. Photo

Inspector Joseph E. Estes (left), U. S. Army Corps of Engineers, and Superintendent Lester L. Talbot pose with a section of 66-inch pipe on the flood-control job at Memphis, Tenn.

sand mortar, and the trench backfilled by a Caterpillar D4 dozer. Around the pipe and 2 feet above, the dirt was built up in 6-inch lifts, compacted with pneumatic tampers powered by a 105-cfm air compressor.

Jacking Pipe

When the main line of the Illinois Central Railroad was reached, the cut-and-cover method of laying pipe was out of the question because of the heavy movement of trains. So the pipe was jacked for 105 feet at a depth of 16 feet below an embankment carrying five tracks—two main-line and three spur. A hole was dug at the east edge of the track, and lined with M-115 steel sheeting on three sides to form a working chamber 18 feet long x 8 feet wide. On the side against the embankment, timber sheeting shored the railroad fill down to the top of the pipe. A few feet below ground level, a 12 x 12 wale ring stiffened the sheeting.

The side of the chamber opposite the railroad embankment was strengthened, as a reaction to the jacking, with 5 vertical 10 x 12's and a 12-inch wall of concrete. This equalized the pressure against the vertical side of the cut, and prevented the jacks from kicking back. A 4-inch-thick concrete slab was laid on the floor of the hole, and steel rails on 32-inch centers were put down to support the pipe as it was jacked. The rails extended 2 feet into the tunnel beyond the edge of the chamber.

The Virginia Bridge Co. of Memphis designed and built a pushing frame made of I-beams to brace a timber 12 x 12 collar, backed with four 12 x 12's bearing against the frame. The collar was grooved out for the lip of the pipe to fit in. Pipe walls were 6 inches thick. Around the lip of the pipe a ¾-inch piece of hemp was laid to make an even bearing between the timber collar and the concrete pipe. The hemp was coated with roofing cement.

10½ Feet a Day

All the jacking was done with two Watson-Stillman 200-ton hydraulic jacks having 9½-inch-diameter plungers 18 inches long. The hydraulic fluid consisted of a gallon of cutting oil to 5 gallons of water. The pump for the jacks operated off a 3-hp electric motor. The jacks were used at only about half their capacity, or 100 tons, on the entire operation. Jacking was completed in a little more than 11 days for the 120 feet. Work began on May 1, and went ahead at an average rate of 10½ feet a day. Jacking was carried on 24 hours a day.

The usual procedure was to jack a pipe length 13 inches, then retract the plungers with railroad jacks to make room for the insertion of the first 12-inch blocks. The blocks had a cross section the same size as the plungers, and consisted of steel cylinders filled with grout and covered with 1-inch steel plates at the ends. Thus a 12-inch block was a 10-inch-long cylinder capped at the ends with 1-inch plates. Blocks were also made in lengths of 2, 3, and 4 feet.

After jacking the pipe an additional 13 inches against the first set of 12-inch blocks, the blocks were taken out and the 2-foot-long cylinders were next set in place. The operation was repeated with the 2-foot blocks, followed by the 3-foot and 4-foot blocks. After the 4-foot block had been jacked against for 13 inches more, a 12-inch block was added and the frame was jacked another 15 inches. Then the blocks were removed, the frame pulled back to the rear of the working chamber, and another section of 5-foot pipe was lowered into position for jacking. Each new section required 6 feet of working space for precise positioning.

As the pipe was being jacked, excavation was in progress at the forward end of the line. Four men worked in the pipe, digging at the header with short-handle picks and shovels, and loading the dirt into a wheelbarrow. This was emptied into a ½-yard skip that was lowered to the bottom of the working chamber, and removed when it was filled by the crane. The muck was spoiled off to the side of the hole. When the jacking and excavation were completed, the insides of the joints were wiped with mortar.

From the end of the 66-inch conduit, a ditch paved with concrete runs through the reservoir. The paving is 7 to 10 feet wide and 4 inches thick, reinforced with wire mesh. It is laid on a bed of sand filter material 3 inches thick.

Quantities and Personnel

The major items on the Wolf River flood-control project at Memphis include the following:

Excavation	227,000 cu. yds.
Compaction of fill	110,000 cu. yds.
Gravel roadway	7,217 sq. yds.
Pipe, 66-inch	2,000 lin. ft.
Paved ditch line	3,110 lin. ft.

An average force of 50 is engaged on the project by the contractor. Lester L. Talbot is Superintendent for the W. L. Sharpe Contracting Co.

For the Corps of Engineers, U. S. Army, R. L. Sorsby is Resident Engineer, while Joseph E. Estes is Inspector in charge at the job site. The Memphis District is headed by Col. L. H. Foote, District Engineer.

Books

AUTOMOTIVE AND CONSTRUCTION Equipment—By C. W. Lindgren. Written for instruction to transportation, civil engineering and military students. This book deals with the driver, mechanic, shop supervision, management and other fundamental information related to automotive transportation, shipping and loading of goods. The author identifies basic principles of automotive and construction equipment management and ownership, and attempts to show that investment can be justified only by efficiency and carrying full loads. Useful for those who are not fully acquainted with capacity of trucks, loading equipment, shovels, cranes, tractors, scrapers, bulldozers, motor graders, rollers, trenching machines, paving and crushing and aggregate washing equipment. 290 pages, 120 sketches. $4.50. Jacksonville Publishing Co., Box 3620, Washington 7, D. C.

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New Improvements For Diesel Engines

Several improvements designed to prolong engine life and reduce maintenance on the GMC Series 71 diesels are announced by Detroit Diesel Engine Division, General Motors Corp., 13400 W. Outer Drive, Detroit 28, Mich.

Chief among these is a new method of oil, water, and compression sealing between the engine block and head, which does away with the laminated gasket commonly used. The adoption of individual seals places primary emphasis upon compression sealing and secondary but sufficient emphasis on sealing the oil and water passages. Because no over-all or one-piece gasket is used, the new system is called the "metal-to-metal" head and block. Installation of these seals, both at the factory and in the field, is a matter of dropping the proper-size seal in the counterbores.

Engine blocks are manufactured 1/16 inch higher to make up for the difference between the old laminated gasket and the new sealing system. Since there is no change in other component parts and in the distance from the crankshaft to the cylinder head, the compression ratio is not affected. Both the head and the block have been materially strengthened. Additional internal ribs were added to the head, and existing ribs and struts in the block were "beefed up." Longer cylinder-head studs with more thread contact were used.

A second new feature is a special chilled-and-tempered cast-iron ring which now forms a replaceable seat for the cylinder-liner upper flange. One of these is dropped into the counterbore of each cylinder before the cylinder liner is inserted, to prolong liner life.

The angle of the exhaust-valve face and the valve-seat inserts has been changed from 45 to 30 degrees to reduce the turbulence of escaping exhaust gases and scavenging air. Experiments demonstrated that "freer breathing" in the engine and longer valve life would result from lessening the exhaust angle, the company says. Since the GM diesel is a 2-cycle engine with air inlet ports in the cylinder liners, there are no intake valves, as such. The sweep of blower-pressurized scavenging air past the valve-in-head exhaust valves keeps these valves cool.

Other design features include roll-burnished crankshaft fillets and peened oil holes in the Tocco-hardened crankshaft. Redesign of the block also enabled Detroit Diesel engineers to improve the retention of intermediate camshaft bearings by installing longer retaining screws.

The improvements are incorporated in current production models of 3, 4, and 6-cylinder single Series 71 GM diesels and multiple-engine units ranging from 51 to 800 bhp.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 732.

New Screw Anchors

Screw anchors for fastening all types of solid materials including brick, wood, concrete, glass, or metal, have been announced by Master Craft Products, 95-01 150th St., Jamaica 4, N. Y. Scru-Tite anchors are made of Tenite and are available for all screw sizes. According to the manufacturer they are light in weight, corrosion-proof, and non-magnetic; they have a low thermal conductivity, are electric insulators, and are not affected by atmospheric conditions.

Scru-Tite anchors are said to be tough, lightweight, corrosion-proof, and non-magnetic. They are made of Tenite.

To install them the user drills a hole to size, drives the anchor into the hole with a hammer, fastens material by inserting the screw, and then screws it in. Over-size screws up to four sizes larger than their corresponding anchor can be used safely, the company says.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 731.

Mobile Materials Barrow

Literature describing the Bell Prime-Mover, a mobile concrete and materials cart with a capacity of 1,500 pounds, is available from the Prime-Mover Co., Third and Oak Sts., Muscatine, Iowa. The unit may be fitted with a 10-cubic-foot tip-type bucket or a flat platform. Powered by a 5-hp gasoline engine, it has direct drive forward and half-speed reverse. The features of its construction are outlined in the circular.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 711.

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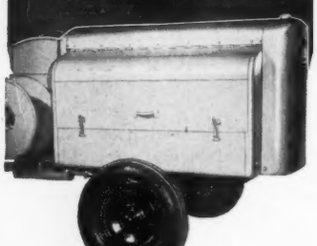

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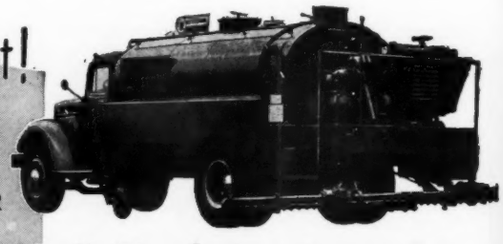

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Engineers Can Reduce Time Overruns on Jobs

(Continued from page 3)

bids are opened. But what about the contractor who won't cooperate?

Contractors Who Offend

Mr. Bugge cautioned engineers to have patience with the small contractor who, for lack of experience, less modern equipment than others, and limited finances, does not make progress comparable to that of older and more stable contracting organizations. "Great oaks from little acorns grow", quoted Mr. Bugge. He reminded his listeners that on a small dirt job of $30,000 in 1919, Harry Morrison and his partner Knudsen overran their time because they had too few horses and fresnoes on the job! "The little fellow who today tries our patience and keeps us guessing whether or not he will finish on time may tomorrow be a leader in his industry", Mr. Bugge said.

It is not the little fellow *per se* who causes the trouble. "It is the type of contractor—not too prevalent but nevertheless numerous enough to be troublesome—who incurs overruns because he is unduly slow in getting on the project. Although he may have the necessary equipment, he is slow in organizing his work forces. Like the proverbial indolent who will not fix the leaky roof because it is not raining, he doesn't worry at the beginning of the job because there is plenty of time, so he thinks. He lets the work lag, the job runs itself, and the worrying comes at the wrong end of the contract period. He is indifferent to the urgings of the engineer and unimpressed by the assistance the engineer could render him if he would but try to cooperate."

There's another type of contractor even more exasperating. "It is the contractor who has abundant financial resources, a full complement of equipment for several jobs at one time, and a good top organization. But withal, he will knowingly bid more construction than he can possibly complete in conformance with completion dates; he trusts that the advantage of keeping his extensive line of equipment busy all the time will more than compensate for the penalties he may have to pay. This contractor is really in the rental business. He is the worst offender because his stability and promises have been taken at face value."

What is to be done with the lackadaisical contractor, and the contractor who is really in the rental business?—especially the latter? There is scarcely anything more discouraging to legitimate bidding than to be underbid by a contractor who has no intention of keeping his commitments, and who purposes to rely on good luck, sympathy, and fictitious excuses to dissipate the penalties he knows he will deserve. If for no other reason than to encourage those who conscientiously try to finish on time, we ought to enforce penalties and liquidated damages against derelict contractors.

Penalties

His own state, Mr. Bugge said, sets $50 a day as the maximum deduction for liquidated damages that may be suffered from overruns. This is inadequate to cover even engineering costs, and it is certainly not large enough to alarm the contractor on a big project. Mr. Bugge feels his state should give thought to increasing the daily penalty and making it proportionate to the size of the project.

However, he warned that the specified amount ought never to be disproportionate to the foreseeable loss or damage to be incurred by tardy performance. It should be large enough to cover these contingencies but not excessive for punitive purposes. For courts in general are inclined to be considerate of the rights of contractors; they are always prepared under the realities of life to grant relief when it is justified. They will sustain a reasonable amount of penalty or liquidated damages if the circumstances are due entirely to negligence or conditions which, with reasonable precaution, the contractor could have prevented.

Rejecting Bids

But regardless of penalties inflicted, what is to be done if the lackadaisical or rental contractor bobs up as low bidder on another project? Should the engineer, in light of previous experience, reject the low bid of the delinquently inclined contractor and award to the next low in the public interest? Some states and most agencies of the U. S. Government have the authority to do this, but not the state of Washington. The statute there, said Mr. Bugge, provides that the director of highways "shall award the contract to the lowest responsible bidder". The unsatisfactory contractor who may now be low bidder was prequalified on the basis of equipment and financial responsibility; if his bid is rejected, Washington law requires that the work be readvertised or that it be performed by the state with its own forces. Unless the state is willing to lose valuable time and readvertise in the hope of getting a more responsible contractor, it appears about as well to accept the low bid. For under the prequalification circumstances, most courts would consider the low bid as coming from the "lowest responsible bidder".

When statutes read "lowest and best bidder", courts have recognized that the lowest bidder is not always the best for the job. Perhaps, Mr. Bugge commented, Washington needs this statutory authorization to reject a low bid and accept the tender of the next low in the public interest. However, he added, states that have this authority seldom or never use it.

The state of Washington *does* have the authority to cancel the prequalification of any contractor for just cause. This appears to be an effectual means of curing the evil of overruns, said Mr. Bugge, and it need not be confined to the small operator. The state has also kept a complete performance record of contractors, and from this and their prequalification statements has given each an experience rating which will be of value in awarding new contracts. It also questions the low bidder before award if it believes he has other work under way which will interfere with good progress on the new work. This will become of increasing concern, said Mr. Bugge, as we get farther into the national emergency, and experience a further tightening of equipment and parts deliveries.

Change in Policy

If engineers are to reduce further the violations of time limits, they will need to change their policy from one

(Concluded on next page)

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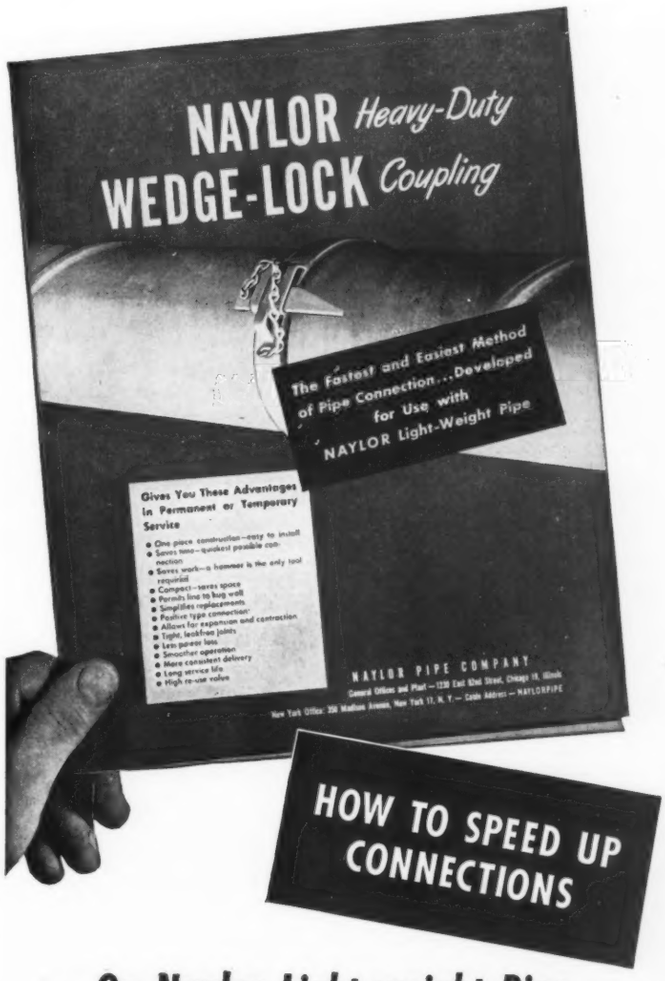
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Engineers Can Reduce Time Overruns on Jobs

(Continued from preceding page)

of considerable tolerance to one of more strict enforcement. Mr. Bugge suggests that the process be started at the level of the resident engineer, who must supply the facts on which to grant or deny time extensions, but that the district engineer take the final responsibility. He must know his projects so well himself that he can from actual contact in the field weigh the facts and make recommendations in accordance. He can exert more influence on the contractor than the resident engineer can. And he is the one who must foresee changes and revisions so well in advance of construction that the contractor will not be delayed or injured by them.

Finally, periodic conferences with representative contractors can be helpful to those on both sides of the fence. These meetings encourage close cooperation, and to a considerable extent they dissipate the suspicion of unilaterality which the wording of specifications and contracts tends to imply.

There is no sure panacea for time overruns, Mr. Bugge concluded—no infallible rule for inflicting penalties or liquidated damages. But engineers can, through recognizing their own responsibility, improve the time performance on jobs.

General-Provisions Spex For Highway Contract Work

Almost 12 years ago the Committee on Construction of the American Association of State Highway Officials set out to prepare some general-provisions specifications for highway contract work. The war intervened, but by 1948 the specifications were ready for review by the AGC and the ARBA. They have now been approved as an Association policy and issued in a booklet, "Specifications for General Provisions". Though no detailed specification could possibly be suitable for use throughout the country, the Committee recommends that the wording of these published specifications be used wherever possible, with such changes and insertions as local conditions make necessary.

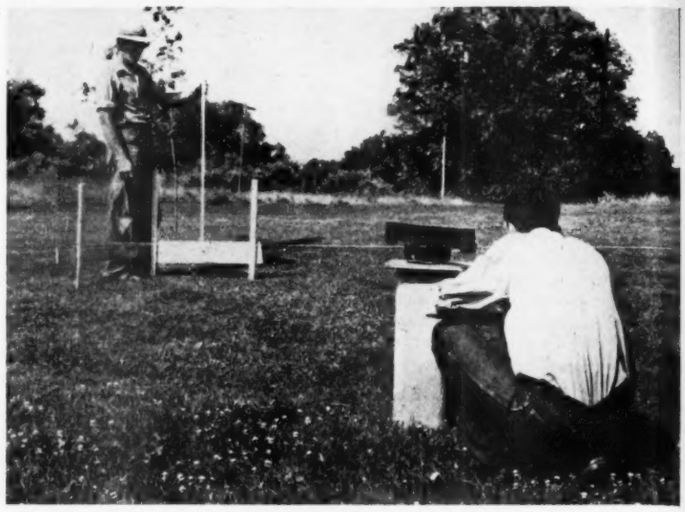
They cover bidding requirements and conditions, award and execution of contract, scope of work, control of work, control of material, legal relations and responsibility to public, prosecution and progress, measurement and payment, wages and conditions of employment.

Copies of the publication are available from the AASHO at 917 National Press Bldg., Washington 4, D. C. They are $2.00 each.

Simple Rough Level

A new Trans-A-Level has been developed by Argyle Mfg. Co., Colchester, Ill., for simple leveling, grading, and surveying. It is simple to operate and uses only an ordinary carpenter's level and small sighting clips. "In use you simply place the Trans-A-Level on any handy platform, put the carpenter's level on top, turn the stub adjusting legs for an exact level, slip on the sighting clips, and go to work", says the manufacturer. The product is compact and can be carried in a toolbox.

Further information may be obtained from the company. Or use the Request Card at page 16. Circle No. 777.



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Man-Made Beach Built On Mississippi Coast

Harrison County Project Includes Seawall Repairs, Extensive Drainage System, and Hydraulic Fill for Wide 24-Mile Beach

• WHAT is considered the longest man-made sand beach in the United States is now being constructed along the Mississippi Gulf Coast in Harrison County, between Henderson Point on the west and the Biloxi lighthouse on the east. The new 24-mile beach, 300 feet wide, is part of a Harrison County seacoast improvement project that will cost around $2,700,000, and take over two years to complete.

This historically old and subtropical section of the Magnolia State has developed into a popular resort area with a brisk tourist trade both summer and winter. A scenic 24-mile seawall was built along the coast between 1925 and 1928 in front of U. S. 90, the Old Spanish Trail, which rims the edge of Mississippi Sound. Over the years this concrete step wall has taken a battering from wind and wave, culminating in the damaging hurricane of September 19, 1947. In all but a few places the wall withstood the heavy seas lashed by the storm, but the concrete walk behind the wall was almost entirely lost, and the drainage system was badly battered as the supporting backfill in the rear of the wall was washed away.

Long before the 1947 hurricane, however, the need for coastal repairs was evident. Erosion had so reduced the sandy beach in front of the wall that for many miles there was no beach whatsoever at high tides. In 1943 the Beach Erosion Board in Washington, D. C., made a survey and study of the beach, and reported its findings to Harrison County authorities and to the Chief Engineer, U. S. Army Corps of Engineers. After the big blow of '47, the Board revised its report in keeping with existing conditions. The recommendations it made are being followed in the current improvement.

Four-Point Plan

The Harrison County program for the beach project consists of the following 4-point plan:

1. Repair of storm-drainage facilities that were damaged in the 1947 hurricane.
2. Repair of damage to seawall caused by deterioration since it was constructed.
3. Installation of an adequate drainage system to secure the seawall against erosion from the rear.
4. Construction of a sloping sand beach to prevent damage and erosion from the Gulf of Mexico side.

The work is being financed by the County and the Federal government, the Harrison County funds coming from cash reserves and a $1,500,000 bond issue. The County Board of Supervisors and the U. S. Army Corps of Engineers exercise general supervision of the project. Construction got under way in January, 1950, and is scheduled for completion in the spring of 1952.

Scenic Seawall

The scenic seawall along the Gulf strand extends from Henderson Point on the Bay of St. Louis easterly through Pass Christian, Long Beach, Gulfport, Mississippi City, Edgewater Park, and Biloxi. Of step-type construction, the wall sections are in two heights—8 feet and 11 feet—the greater length of wall being 11 feet high. Built of reinforced concrete, the wall has 12-inch risers and 18-inch treads. Elevation at the top of the wall averages from 8 to 11 above mean gulf level. Along the front of the wall is a row of RC sheet piling, 10 feet deep x 24 inches wide x 7 inches thick. The 11-foot wall is supported on two rows of 12 x 12 RC piles, 18 feet long, while a single row of the same-section piles, 15 feet long, supports the 8-foot wall.

County forces made all the repairs to the seawall, starting in January, 1950, and finishing in January, 1951. Disintegrated concrete was cut out with

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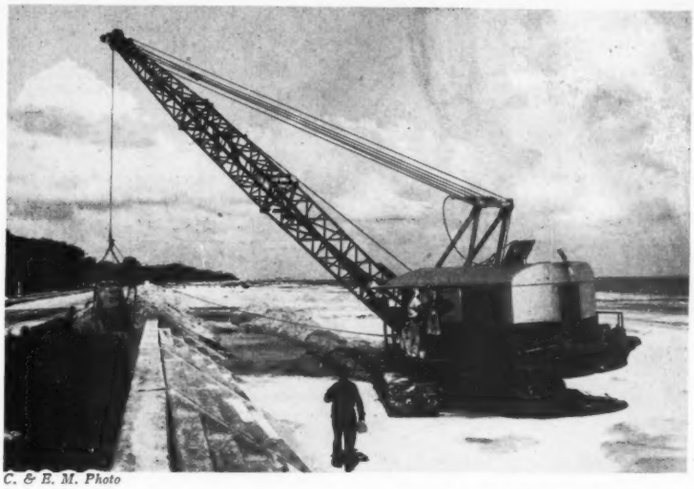

C. & E. M. Photo

A Lima dragline with an 85-foot boom and a ⅝-yard bucket backfills behind the Harrison County seawall at Pass Christian, Mississippi. The material being used is rubble from a broken-up sidewalk.

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Man-Made Beach Built On Mississippi Coast

(*Continued from preceding page*)

air hammers, and replaced with Gunite. The necessary machines for this pneumatically placed concrete were obtained on a contract-rental basis from the Pressure Concrete Co. of Florence, Ala. The broken-up sidewalk behind the wall was not replaced. The rubble remaining was used as backfill under the wall in places, and the major portion for groins extending 400 feet or more out into the gulf. In the few locations where sheeting was lost, new panels were installed. All the square bearing piles had held fast.

While point 2 of the program—repairs to the seawall—was being carried out, the County also repaired the storm-sewer facilities leading down to the wall. There they stopped, for the original method of putting a drain through the wall about every 240 feet was discontinued. Instead, a trunk-line storm drain was laid behind the wall as a collector pipe into which the smaller pipes emptied. Outfalls to the beach were limited to 1,000 or 1,200-foot intervals. Outlets no longer needed were sealed up.

Drainage System Behind Wall

Repairs to the existing sewer facilities under point 1 developed into point 3 of the plan—the installation of an adequate drainage system to secure the seawall against erosion from the rear. For the drainage and beach work the project was divided into four sections—A, B, C, and D—of approximately equal length, with the lettering running from west to east.

Behind the wall there are 19¾ miles of reinforced-concrete trunk-line storm sewer, ranging in size from 12 to 42-inch diameter. The pipe is reinforced with a single line of steel in the center of the wall to provide the maximum coverage and protection from the salt water. Wall thickness varies from 2 inches for the 12-inch pipe up to 5 inches for the 42-inch pipe. The County purchased the entire supply of pipe from the Faulkner Concrete Pipe Co. of Gulfport, Miss., where it was manufactured. Total cost of the drainage system is estimated at $1,388,041, of which $463,151 is for pipe and $924,890 for installation.

Bids were solicited for laying the pipe either on a straight contract basis, or on an equipment-rental plan with county forces doing the bulk of the work. Under the latter arrangement, the firm renting the equipment also supplied the necessary skilled operators. After a comparison of bids with the estimated cost, the County awarded a contract to E. L. Kennedy on a low bid of $170,000 for installing pipe on one section. On the other three sections the prices favored the work being done on the equipment-rental basis, with the County supplying the labor.

Pipe Installation

Pipe was laid a few feet behind and parallel to the seawall, at an average depth of 7 feet below the top of the wall or at elevation 3. It provides for continuous drainage of the entire area behind the wall, with storm sewers entering this collector pipe at frequent intervals. Long stretches of the storm-water main, separated by short gaps, drain into Mississippi Sound through outfalls constructed through the wall and across the beach. A typical outlet consists of a concrete manhole, and continues with a double or triple pipe line until elevation minus 0.5 is reached. These outfalls extend across the beach approximately 250 feet beyond the wall.

Cofferdams built of sand were kept dry enough to work in by timing the operations for low-tide phases, and having enough pumps on hand to hold down the water. Outfalls are covered by the new beach except at the discharge end where the pipe is about halfway out of the sand. Riprap was placed around the outlet for protection. Where live streams were encountered, reinforced-concrete culverts were constructed adjacent to the seawall and extending 35 feet beyond the lower step. The drainage was carried across the beach through open ditches protected by reinforced-concrete sheet piling 10 feet long and with concrete caps.

All sizes of the trunk sewer pipe are bell-and-spigot type made in 4-foot lengths. For economy and speed in laying the pipe, five of the 4-foot lengths were joined together on the ground before being placed in the trench as a 20-foot section. The joints

(*Continued on next page*)

Gulfport Daily Herald Photo

Tongs attached to an I-beam made pipe-lifting easy on the Harrison County seawall and beach project.

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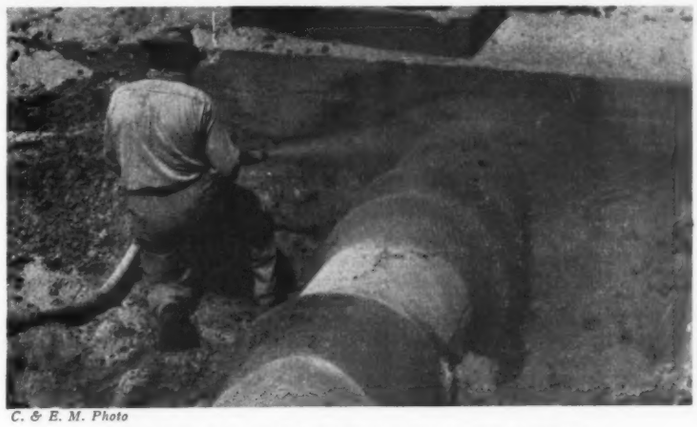
Crews fill Cement Gun with a 2:1 mix of sand and cement.



C. & E. M. Photo

A pipe joint at an outfall structure in the seawall is Gunited.

were first caulked with oakum, then completely sealed with a cover of pneumatically placed concrete mortar. These tight connections prevent the fine sea sand from sifting into the pipe, which would result in troublesome maintenance later on to keep the lines open. Pressure mortar was also used to connect the 20-foot sections in the trenches, and where the pipe entered the outfall structures.

Pressure Mortar

Two types of machines were used to place mortar pneumatically in the joints—Groutweld and Cement Gun. A typical crew on the Cement-Gun, or Gunite, work consisted of six men. The Cement Gun was mounted at the rear of a flat-bed truck, while another truck delivered river sand and Ideal bag cement to the job site. The sand was dried out by placing it in a metal pan and building a fire underneath. Then it was screened through a No. 4 sieve and mixed with cement in the proportions two parts of sand to one part of cement. Water was pumped to the machine by a Fairbanks-Morse gas-driven pump from a 1,000-gallon tank mounted on a truck.

A Chicago Pneumatic 315-cfm compressor supplied air at 50-pound pressure to the Gun for forcing the sand-cement mix through a 1½-inch material line, and the water through a ½-inch hose line. Total length of hose was 200 feet, which eliminated frequent shifting of the equipment setup as the crew worked along the pipeline. From the nozzle at the end of the hose, the sand-cement mix and water were blended, as a face was built up over the joint with mortar under pressure.

Each of the county crews engaged on the three drainage sections being handled on an equipment-rental basis were provided with a dragline for trench excavation; pumps for unwatering the cuts; air compressor; machine for pneumatically placing the joint mortar; and a tractor-dozer for backfilling the trench. The draglines set the pipe in the trenches with a pickup specially designed to lift the 20-foot sections with an even distribution of the loading. The pickup consisted of an 8-inch I-beam supported at the ends by lines to the crane hook. Four pairs of tongs attached to the I-beam slipped over any size of pipe making up a 20-foot section. For curing, the mortar joints were coated with Curcrete. Ready-mix concrete was used in the outfall structures.

Building the Beach

The Harrison County beach receives some protection against storms blowing out of the Gulf of Mexico from a string of islands 10 to 12 miles offshore, forming Mississippi Sound. There is no littoral drift, nor is there any erosion from the normal tides, which have a differential of less than 2 feet. Practically all the beach erosion has resulted from storms or squalls causing rapid rise and fall of the waters in the Sound, accompanied by high wave action.

The new beach being constructed to a width of 300 feet from nothing, in most of the 24-mile stretch, is made of white sand dredged from the Sound. About 6,000,000 cubic yards of hydraulic fill will be required for the beach, which has a 50-foot-wide berm at elevation

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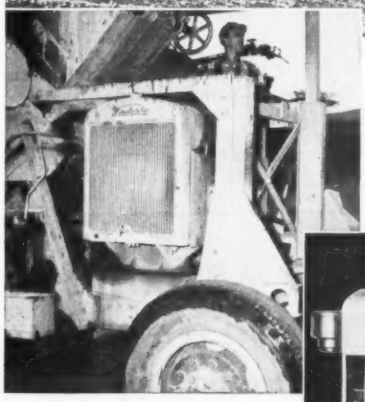
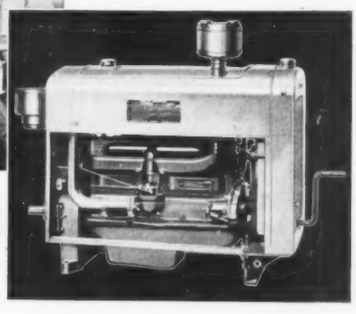
SPEEDING IT UP—



HAISS Bucket Loader powered by WAUKESHA Model 6-BZU Power Unit keeps aggregate moving—stockpile to dump truck to job.

Model 6-BZU WAUKESHA Power Unit —six cylinders, 4-inch bore x 4¼-inch stroke, 320 cu. in. piston displacement.



WAUKESHA POWER

● Making materials *move!* Loading, excavating, hoisting—the heavy duty jobs—this Waukesha 6-BZU power unit puts out a lot of power, smoothly and steadily, and doesn't take much fuel to do it. It's a sturdy but simple six of the L-head type—ready and reliable. Its deep cylinder block and crankcase is a single casting of Waukesha alloy iron . . . with 7-bearing cross walls and a substantial top deck to hold the structure in rigid alignment, cutting down vibration and wear. The Waukesha intake manifold is specially designed in combination with the controlled turbulence combustion chamber. Full pressure oiling and centrifugal pump cooling. Details in Bulletin 1269. 143

WAUKESHA MOTOR COMPANY; WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES

WAUKESHA

A Jaeger never races to prime

Pump longer because they pull stronger, at easy speeds

Dewatering 1500′ of 8′ x 14′ deep sewer trench at a river crossing, this 4″ Jaeger pump handled 40,000 gph at average speed of only 1200 rpm (10% to 15% lower speed than other pumps), and reprimed quickly, as needed, at 1400 rpm (compared with 1800 to 2000 rpm required to prime ordinary pumps). This is typical performance. Jaeger's larger shells and impellers, double priming action and use of largest engines applicable mean high efficiency, fuel economy, long life—in 1½″ to 10″ pumps.

See your Jaeger distributor or send for Catalog P-10

THE JAEGER MACHINE COMPANY 701 Dublin Avenue, Columbus 16, Ohio

COMPRESSORS • MIXERS • HOISTS • TOWERS • PAVING MACHINERY

Man-Made Beach Built On Mississippi Coast

(*Continued from preceding page*)

5 running along the wall. From the edge of this level berm the beach slopes 1 in 50 for 250 feet to a theoretical 0.0 elevation. Adjacent to the wall the fill has a depth of 7 feet from minus 2 to plus 5 elevation.

Yardage of hydraulic sand fill for the four sections into which the beach is divided is as follows:

Section A	1,828,873 cu. yds.
Section B	1,385,601 cu. yds.
Section C	1,341,806 cu. yds.
Section D	1,428,609 cu. yds.
Total	5,984,889 cu. yds.

McWilliams Dredging Co. of New Orleans, La., submitted low bids on Sections A, B, and D of the project, and was awarded the work. The fill on Section C was awarded in July. The contractor's unit price per yard for Sections A and B was 0.2243, and for Section D the price was 0.2493 per yard, or a total of $1,077,158.73 for three of the sections.

Hydraulic Fill

McWilliams Dredging Co. subbed out the work in Section D to Benton & Co. of St. Petersburg, Fla., which built up its part of the fill with the No. 3, a 16-inch hydraulic dredge. McWilliams used its 20-inch dredge Natchez, powered by a 1,200-hp diesel engine. Dredging started at Henderson Point, the western end of the seawall, and proceeded easterly over Sections A and B. A was completed by the middle of May, B in August, and D in September. Section C will be completed early next year. The County planned to have all the drainage installed by this month.

Material for the beach fill was taken from the bottom of Mississippi Sound, at least 1,500 feet off the seawall. At that point the water is shallow, averaging only 4 feet in depth. The Natchez cut a channel with a maximum width of 175 feet, and a depth of between 15 and 18 feet. From the stern of the dredge the floating line, supported on pontoons, varied in length from 1,500 to 3,500 feet, ending at an off-shore valve house also supported on pontoons. From that point the line submerged for the remainder of the distance to the beach. The submerged line, 700 to 800 feet long, was used since the depth of the water close to shore did not provide enough draft for the pontoons.

The Sound bottom supplied excellent material for the beach fill, with the Natchez pumping 18 to 20 per cent solids through its discharge line. Predominantly sand, the little clay that was contained ran off with the discharge water from the beach. The outlet pipe was laid parallel to the seawall; no baffle boards were required to retain the fill, which assumed a natural slope. A surplus of material, above the required grade, was pumped alongside the wall for its full length. This excess sand was later dug up by dragline and cast over the wall to provide the necessary backfill at the rear and on top of the drainage pipe.

Personnel

The Gulf Coast seawall and beach project is under the supervision of the Harrison County Engineering Department with headquarters at Gulfport, the county seat. Arthur MacArthur is County Engineer, and H. A. Campbell is Assistant County Engineer.

The Limb-Lopper tree trimmer is air-operated and insulated against electric shock. Here a worker clears a power line with it.

Tree Limb Cutters

A line of air-powered tree-trimming tools, insulated against electric shock for work around power lines, is announced by Miller-Robinson Co., 7007 Avalon Blvd., Los Angeles 3, Calif.

Single-piston and double-piston models are available. The standard lopper is 6 feet 8 inches in length and has a cutting capacity of 1¼ to 1¾ inches. The heavy-duty model has an over-all length of 7 feet 2 inches and cuts limbs up to 2½ inches in diameter, the company says. Extender units are also available and can be added as needed, depending upon the total lopper length required. Each insulated extender unit is 48 inches long and weighs 3 pounds 3 ounces.

The Limb-Loppers can be operated from any self-contained power source or power-takeoff compressor with capacities of 17 to 30 cfm at 125 to 150 psi.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 743.

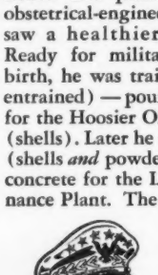
Preventive maintenance is more essential than ever. The careful selection and use of good lubricants at regular intervals will keep your equipment operating efficiently.

COMMENT *from the* **BUTLER ENGINEER**

October, 1951

Old Soldiers Don't Even Fade Away

The Story of a 6-star General: He was born in Wisconsin just before World War II at the Butler Bin plant. I was the obstetrical-engineer and I never saw a healthier youngster. Ready for military service at birth, he was trained—(or air-entrained)—pouring concrete for the Hoosier Ordnance Plant (shells). Later he was promoted (shells *and* powder) to pouring concrete for the Lone Star Ordnance Plant. The Navy wanted his great production talent—so, (no nonsense about inter-service competition) he poured the Navy Base in Utah.



SIX STAR GENERAL

Now a brilliant leader, he won his 4th star in a top secret job—ready mixed concrete for the immense A-bomb Plant in Washington.

His 5th followed: concrete for the rocket-powder Government Ordnance Plant in Arkansas.

Then came peace and civilian life. Perhaps for sentimental reasons he accepted a key position pouring for a large dam in Wisconsin—his birth state. As the last yard was poured, he was asked to reenter military service. . . . His delight was unbounded when he found he was to ready-mix for the *H-Bomb Plant*—and with it now has come his 6th star of command. As you see, he just *won't* fade away! If I weren't a conservative engineer I'd say that the progeny of Butler Bin had an actual *genius* for production and the durability of Gibraltar.

See you in December.

The Butler Engineer

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1 Literature or further information from any C & E Monthly advertiser in this issue

2 Further information on any new product described editorially in this issue

3 A reprint (while they last) of our article "Prestressed Concrete: Its Future in the U.S."

Use the request card bound in at page 16. No postage is required.

Contractors and Engineers Monthly
the NEWSpaper of highway and heavy construction
470 Fourth Ave., New York 16, N. Y.

Air-Gravel Concrete May See Future Use

An experimental lightweight concrete recently developed by R. C. Valore, Jr., and W. C. Green of the National Bureau of Standards substitutes air bubbles for sand. Suitable for monolithic walls and other elements of small structures, it is said to be water-resistant and an excellent insulator against heat or cold.

The advantages it offers in reduced density and thermal conductivity are appreciable. But they are gained only at a great sacrifice in strength. Higher cement and air contents might gain greater advantages, but the relatively high density of conventional aggregates imposes certain limits. In relatively high-air-content concretes, the use of lightweight aggregates blended with dense aggregates may be a means of reducing density and thermal conductivity while maintaining low-order drying shrinkages.

The following is a summary of a report prepared by Valore and Green, and published in the *Journal of American Concrete Institute*, June, 1951, Proceedings, Vol. 47, Page 833:

In air-gravel concrete the fine aggregate or sand is replaced by air bubbles, which act as a lubricant and produce a very workable mixture. High-air-content concrete is prepared in conventional mixing equipment in the normal way, except that an industrial aerating agent or a detergent is added to the mix to cause it to foam by entraining finely divided air cells in the cement-water paste. Entrained air may constitute up to 45 per cent of the volume of the concrete prepared at the Bureau, and pea gravel forms the dense aggregate.

One of the functions of fine aggregate in conventional concrete is to produce workability, which facilitates placing in forms and assures homogeneity in structural members. Results of an investigation at NBS indicate that replacing conventional fine aggregate by entrained air likewise produces workable mixtures having relatively low water-cement ratios. The mixtures studied consisted of a high-early-strength portland cement, siliceous pea gravel (No. 4 to ⅜-inch sieve fraction), water, and an air-entraining agent. Two different air-entraining agents (foam stabilizers) were used: agent V, a proprietary neutralized resin; and agent X, a proprietary sodium lauryl sulfate-type detergent. The falling action of the gravel particles during mixing in an ordinary rotating tilt-drum mixer produced the entrainment of air in the cement-water paste, and the air-entraining agent rendered the foamed paste stable.

Air contents as high as 45 per cent were found possible in concretes containing no sand, while there appeared to be a "ceiling" of about 30 per cent in the air content of experimental mixtures containing both sand and gravel. However, the amount of entrained air, upon which the density depends, was limited critically by the minimum compressive-strength requirement of 500 pounds per square inch. The lowest cement content permitting the attainment of the required strength in an air-gravel concrete was about 3¼ bags of cement per cubic yard of concrete. In this lean mix it was necessary to maintain an air content of about 25 per cent to provide the necessary workability and strength. A second mix, containing about 5.6 bags of cement per cubic yard of concrete, provided the required strength for air contents as high as 29 per cent.

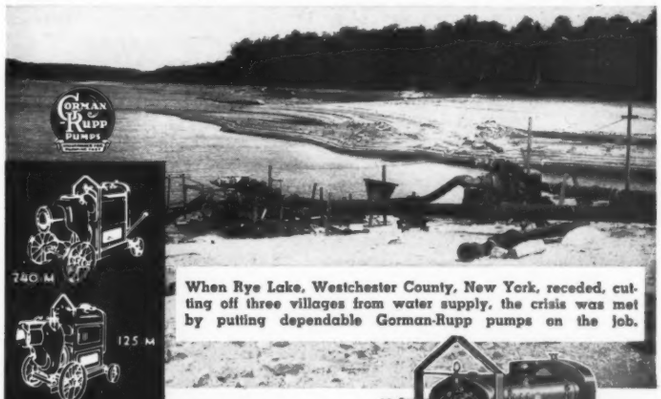
The compressive strength was sensitive to variations in air content; an increase of 1 per cent in air content was generally accompanied by a decrease of about 100 psi in compressive strength for both mixes. The indicated density of concretes having a compressive strength at 28 days of 500 psi was about 105 pounds per cubic foot, as compared with 140 to 145 for conventional (nonaerated) sand-gravel concretes. While the compressive strengths were only ¼ to ⅛ the values obtained for nonaerated concretes, the moisture properties and thermal conductivity of the air-gravel concretes compared favorably with the values obtained for the denser concretes.

French Branch to Make Admix

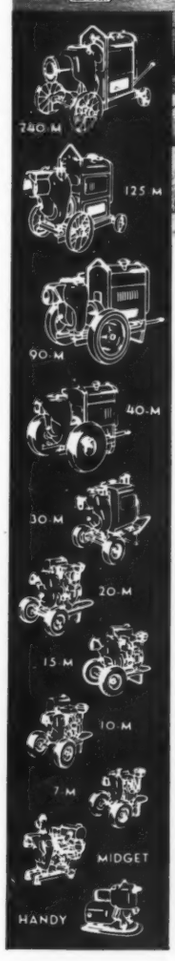
Concrete Chemicals Co. of Cleveland, Ohio, is going to set up a French branch to make concrete admixtures which it will sell to European and other foreign investors. The Economic Cooperation Administration has issued the company a $90,000 Marshall Plan currency convertibility guarantee on its investment. Among the foreign construction projects which are potential users of admixes is a large European tunnel job which would require 400,000 pounds of admix annually for 3 years.

Eastern Massachusetts is assured of a better water supply now that this 36-inch steel main has been installed from the Fells Reservoir in Boston to Swampscott. Key digging equipment was this 3¾ backhoe, owned by Contractor S. Rotondi & Sons, Stoneham, Mass. The Marion was also used to lay the main.

Gorman-Rupp's Handle Low Water Crisis at Rye Lake



When Rye Lake, Westchester County, New York, receded, cutting off three villages from water supply, the crisis was met by putting dependable Gorman-Rupp pumps on the job.



240-M
10 inch

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CENTRIFUGAL PUMPS

Whatever the job requires: a tiny twenty pound "Handy" pump, a lightweight "Midget" pumping 5500 GPH, or a pump handling up to 240,000 GPH, you will find the most efficient pump is the Gorman-Rupp.

QUICKEST PRIMING: The 40 M, for example, primes at 15 foot Suction Lift in 40 seconds.

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FASTEST PUMPING: More water per gallon of fuel than any other comparable pump.

DEPENDABLE: The most simple pump built — will not clog. Trouble-free, requiring a minimum of maintenance.

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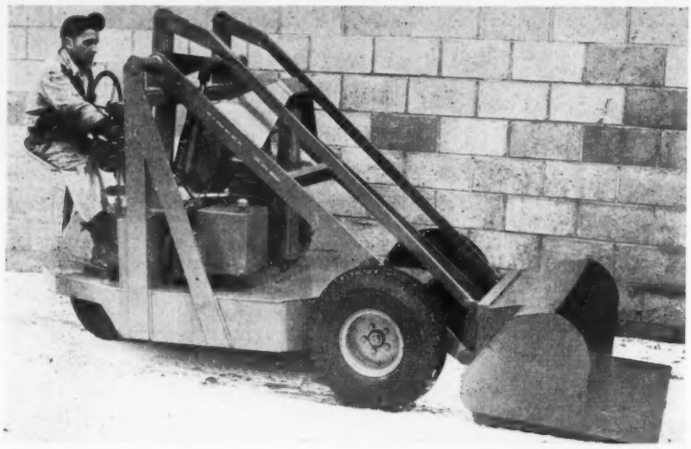

This new hydraulic loader, recently announced by Getman Bros., converts to bucket or fork-lift operations. It has an automatic self-leveling lift.

A Hydraulic Loader With Bucket or Fork

A new hydraulic loader that converts to bucket or fork-lift operations is announced by Getman Bros., Manufacturing Division, South Haven, Mich. The 3-wheeled unit will turn in a radius of 6 feet. Hydraulic controls permit positioning the bucket at all heights, up to 7 feet 4 inches.

The Getman loader is constructed of welded steel members and is powered by a 13-hp air-cooled engine. It may be fitted with an 8-cubic-foot bucket or a 1,000-pound-capacity fork lift. The loader has an automatic self-leveling lift to keep the load parallel to the ground throughout the lift cycle. Other features of the machine include caster-wheel steering, with positive control through a roller-bearing-mounted worm and gear mechanism; high-gear speed of 15 mph; truck-type transmission; and complete visibility for the operator under all working conditions.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 705.

Concrete Standards Published

All current standards of the American Concrete Institute except the "Detailing Manual", available separately, have now been published in book form. The newly revised Building Code is included—also Specifications for Concrete Pavements and Bases, and a new standard on pneumatically placed mortar. Other standards give information on applying portland-cement paint, winter concreting, requirements for precast floor units, design of concrete mixes, specifications for cast stone, etc.

"ACI Standards—1951" is available from the American Concrete Institute, 18263 W. McNichols Road, Detroit 19, Mich. It costs $3.00 a copy.

Portable Air Tank Fills Tires on Site

The Handy-Air-Tank will completely inflate, from one filling, 4 or 5 average tires or 15 to 20 partially slack tires, according to the manufacturer, B & L Products Co., Inc., 337 Peters St., S. W., Atlanta, Ga. This lightweight portable unit refills from any ordinary air line. Used on the same principle as the water bucket, the air tank brings an adequate air supply right to the job. Made of noncorrosive stainless steel, it has a volume of 2,100 cubic inches and is designed for allowable working pressures of 400 psi.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 784.

Rugged Side-Dumps Carry 15-Ton Loads

Gooseneck semitrailers with two side-dump body designs are a new addition to the line of heavy-duty off-highway equipment made by Easton Car & Construction Co., Easton, Pa.

The Model TL-1015 is a lift-door side-dump with a 15-ton capacity. A Caterpillar DW10 diesel tractor provides the tractive power. The lift-door body is intended for fixed-point dumping, using the Easton electric overhead dumping system. The push-button-controlled overhead hoist operates a dual hook which catches the two dumping bars on the lift door. The door rises clear of the load and acts as a bail to lift the body to the complete discharge angle. Stabilizer feet, incorporated with the body hinges at each end, rest on the hopper wall to steady the trailer frame as the unit dumps. Maximum dumping angle is 70 degrees.

Body and trailer frame are of all-welded steel with heavy box-section reinforcements throughout. An oak floor cushion and replaceable steel liner plate reinforce the body floor. Bendix-Westinghouse air brakes and 21.00 x 25 twenty-ply tires are other features.

Lift-door trailers of the same design will be available in 30-ton capacity for use with a larger tractor. This new

Easton's new side-dump Model TL-1015 lift-door gooseneck trailer.

Easton line will also include 15 and 30-ton automatic drop-door hydraulically dumped units for pit, mine, and construction services.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 782.

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• Picks itself up • Easily extends
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If smooth, fast, easy lifting and lowering are important to you . . . you will profit by standardizing on Duff-Norton Hy-Power Hydraulic Jacks. Capable of being used in both vertical and horizontal positions, these jacks have the all-around versatility you need. In the Duff-Norton Hy-Power line you'll find the correct sizes too: capacities from 3 to 50 tons . . . closed heights from 4½ to 11 inches . . . lifting heights from 2 to 7¾ inches.
These jacks are ruggedly built to give long service under the most severe working conditions. You'll find them real time and money savers on every lifting and lowering job.
Duff-Norton Jacks include hydraulic, ratchet, screw and air motor power models, in capacities ranging from 3 to 100 tons.
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HYDRAULIC JACKS
Write for Bulletin AD 16-D which describes and illustrates Hy-Power Hydraulic Jacks.
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STRENGTH, SAFETY, DURABILITY
DUFF-NORTON JACKS
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Van Brush Mfg. Co. 47
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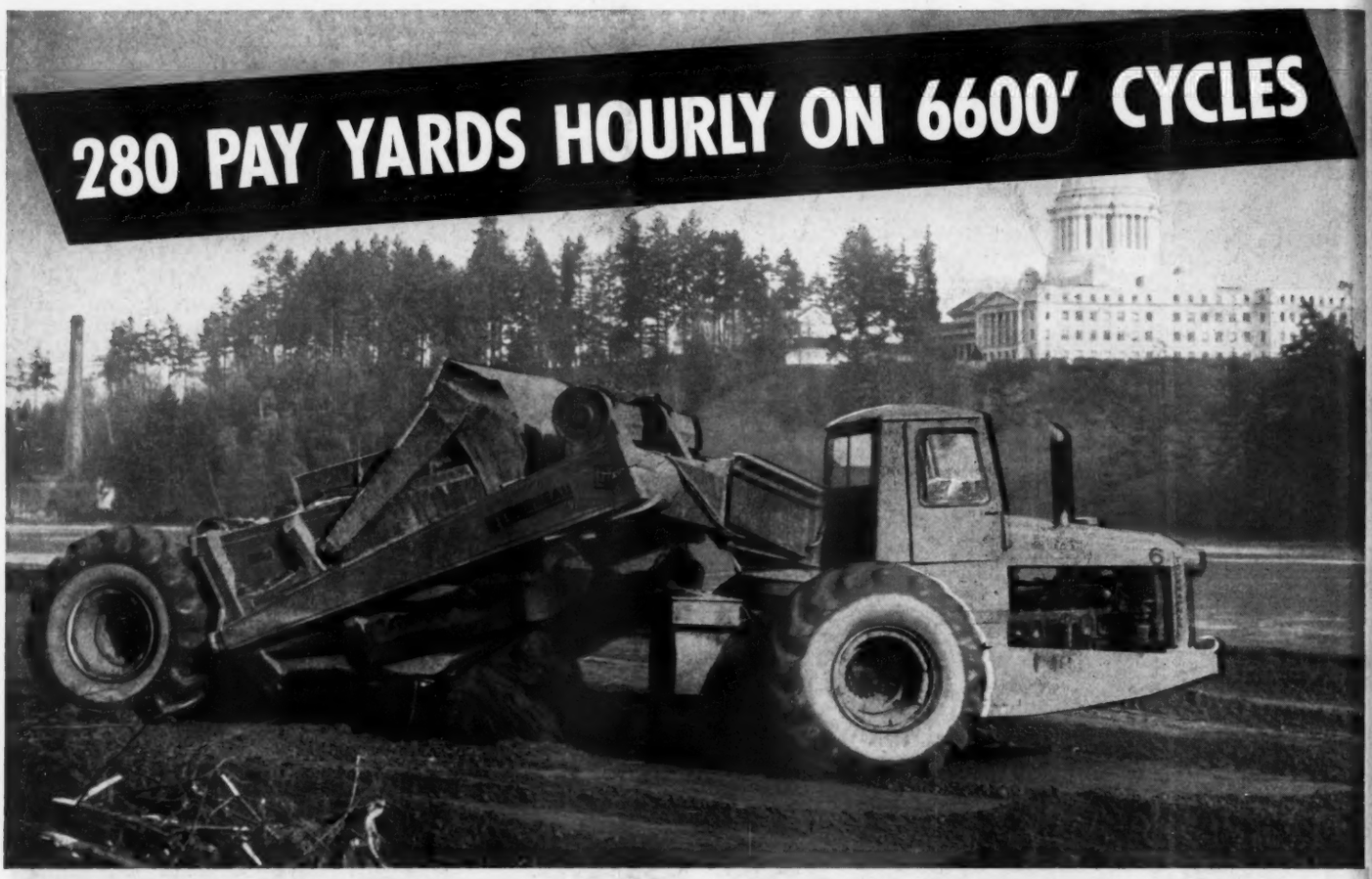
Winslow Scale Co. 65
Wisconsin Motor Corp. 91
Woods Mfg. Co., J. E. 68
Worthington Pump & Machy. Corp. 10

280 PAY YARDS HOURLY ON 6600′ CYCLES



for 3 electric C Tournapulls spreading wet sand on lakeside fill

THOMAS SCALZO, CO. of Seattle, on construction of a 500,000-yard roadway along the Deschutes Basin in Olympia, Washington, is licking bad weather and tough materials with a fleet of 3 new, electric-control C Roadster Tournapulls and 3 Super C Tournapulls. The 6 LeTourneau rigs are handling "dead", hard-to-load sand, gravel, and clay . . . often working during and right after heavy rains. Here's the kind of performance which is keeping the job on schedule:

6600′ cycle every 5.88 minutes

Haul from borrow pit to lakeside fill averages 3100 ft. . . . return trip is 3500 ft., including 600 ft. of 10% grade approach to cut. The 3 electric C Roadsters, top production rigs of Scalzo's fleet, complete this 6600′ cycle every 5.88 minutes . . . each "C" delivers 8 to 9 loads (88 to 99 pay yards) an hour throughout the 8-hour day.

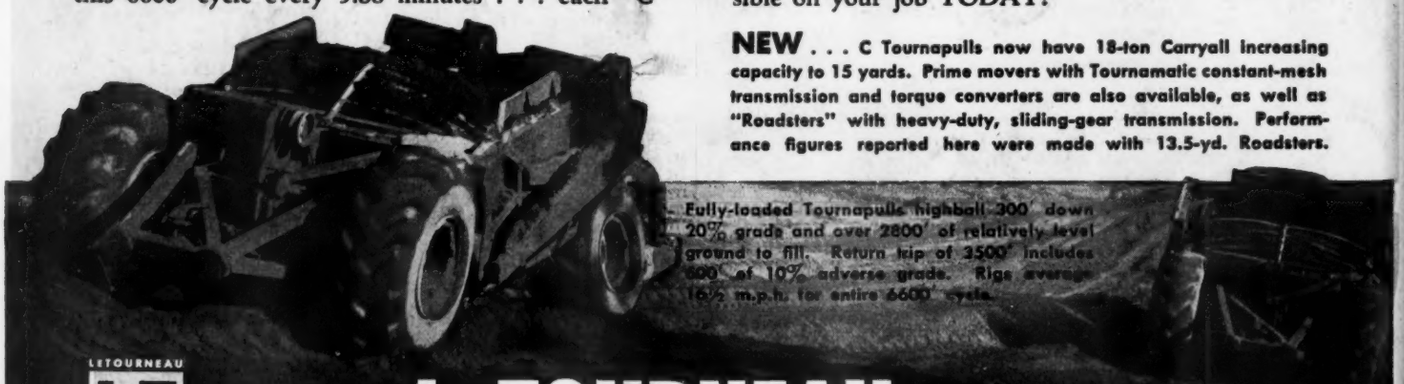
Lick steep, wet grades

These electric-control C Roadsters easily pull the wet, 10% return grade. With positive power steer, torque-proportioning differential, and 5% tapered-bead tires, the "C's" keep working when other rigs are stopped because of wet weather. "Tournapulls are very good machines for adverse weather conditions," is the way Robert J. Scalzo, partner, puts it.

See your LeTourneau Distributor

Take it from Mr. Scalzo, a LeTourneau equipment owner since 1935 . . . it pays to modernize with new, electric-control Tournapulls. Ask your LeTourneau Distributor to estimate production and savings possible on your job TODAY!

NEW . . . C Tournapulls now have 18-ton Carryall increasing capacity to 15 yards. Prime movers with Tournamatic constant-mesh transmission and torque converters are also available, as well as "Roadsters" with heavy-duty, sliding-gear transmission. Performance figures reported here were made with 13.5-yd. Roadsters.



Fully-loaded Tournapulls highball 300′ down 20% grade and over 2800′ of relatively level ground to fill. Return trip of 3500′ includes 600′ of 10% adverse grade. Rigs average 16½ m.p.h. for entire 6600′ cycle.

LETOURNEAU LET EQUIPMENT

R. G. LeTOURNEAU, INC., Peoria, Illinois

HIGH-SPEED, RUBBER-TIRED EXCAVATING • HAULING • LIFTING EQUIPMENT

Carryall, Tournapull—Trademark Reg. U. S. Pat. Off. Tournamatic—Trademark R241 A